DEVELOPMENT OF RECOMMENDATIONS AND GUIDELINES FOR PAVEMENT REHABILITATION DESIGN PROCEDURES FOR THE STATE OF IDAHO

PHASE 2: Development of a Mechanistic-Based Overlay Design System

ITD Project Number RP 121, Agreement No. 95-60 NCATT, University of Idaho Contract Number FM-K372

Volume II FLEXOLAY Program User Manual

Submitted to:

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Installation and Operation of

FLEXOLAY 1.2

An Overlay Design Program for Flexible Pavements

1. System Requirements

As with any program, there are some specific hardware that are needed to run the overlay design program. The following is the minimum recommended hardware:

- MS-DOS operating system version 3.0 or later.
- Personal computer using 8088 or higher microprocessor.
- Machine with 1 MB of memory or greater.
- 1 MB free hard-disk space.
- Math co-processor.
- VGA, EGA, Hercules, or other compatible color monitor.
- Mouse or compatible pointing device (recommended).

2. Program Installation

To Install FLEXOLAY in the hard disk, follow the following steps:

- Create a directory in the hard disk and name it C:\FLEXOLAY. At the DOS prompt, type: C:\>md FLEXOLAY and enter.
- Place the distribution diskette of the FLEXOLAY program in the floppy diskette drive (e.g. Drive A).
- Copy all files from drive A to the created directory. From A:> Prompt type A:>COPY *.* C:\FLEXOLAY and enter.

 Now the C:\FLEXOLAY sub-directory contains all files on the FLEXOLAY distribution diskette. Make sure that the following three files exist in the sub-directory:

FLEXOLAY.EXE, SYSAN.EXE, and DOSXMSF.EXE

3. Starting The Program

After the installation of the program is completed, type FLEXOLAY at the directory which contains the copied program files, (i.e., C:\FLEXOLAY> FLEXOLAY). This will start the program and display the introduction screen. Move the mouse or press ENTER to clear the introduction. The screen will show a menu bar and a title bar as shown in Fig. 1.

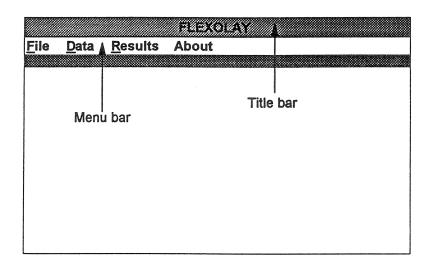


Figure 1 Overlay program menu bar.

After this step, the program is ready to take the commands. The menu bar contains File command menu, Data command menu, Results command menu and the About command. Each command menu contains related commands as shown in Fig. 2 through Fig. 4. There are two ways to select a command with the mouse:

 clicking on the menu name and dragging the mouse down while keeping the mouse button pressed. When the command of interest is highlighted, releasing the button will run the command. • Clicking once on the menu name. The menu will remain open. Moving the pointer to the command of interest and clicking the mouse will run the command.

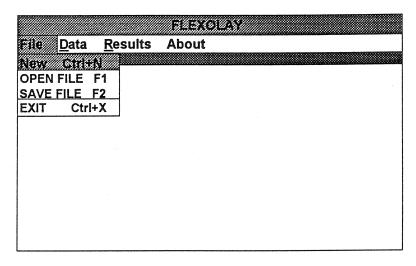


Figure 2 File command menu.

			F	85(C)	SV.		
<u>F</u> ile	Data	<u>R</u> esults	Ab	out			
		MENT		Sec.			
	1	PARAMET	ERS	Ctrl+S			
	GENE	RAL		Ctrl+G			

Figure 3 Data command menu

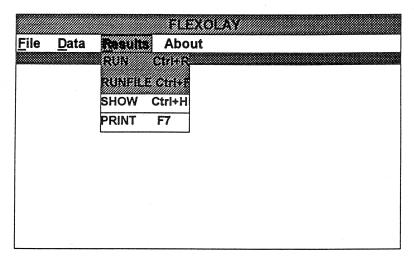


Figure 4 Results command menu.

Access to commands by the keyboard can be done by pressing Alt key. This will activate the menu bar. The command menu of interest, then, can be highlighted using the left and right arrow keys. Pressing Enter key will open the command menu and the command can be selected by using the up and down arrow keys. Once the command is selected, pressing Enter key will run the command. There are also short cut keys to activate a command menu and they are as follows:

- Alt+F to activate the file command menu.
- Alt+D to activate the data command menu.
- Alt+R to activate the results command menu.

4. Program Menu Bar Commands

Before describing the different commands under the different bar commands it is helpful to visualize the entire program operation as a hole. This can be can be done by understanding Figure. 5

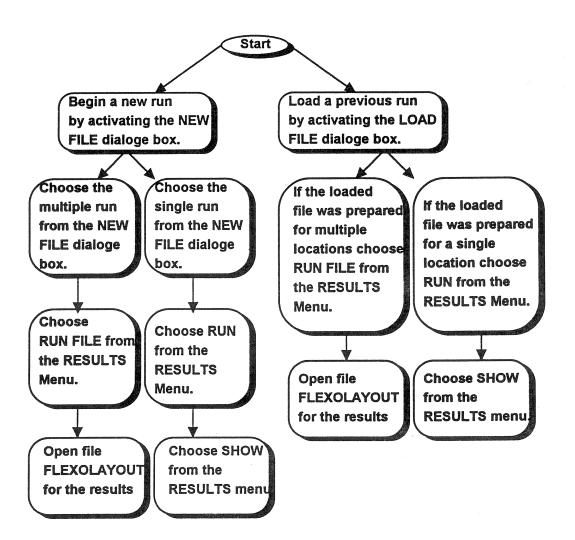


Figure 5. Overview of the program

The option of multiple locations facilitates running the program for different sets of moduli values as will be discussed later.

4.1 File Commands:

The file commands are :

- NEW (to clear the memory and open a new file short cut key Ctrl+N).
- LOAD FILE (to load an existing file short cut key F1).
- SAVE FILE (to save current file to disk short cut key F2).
- Exit (to terminate the program short cut key Ctrl+X).

The <u>new file</u> command opens a dialog box as shown in Fig. 6. The dialog box lets the user choose between two options:

- Running a single location.
- Running multiple locations.

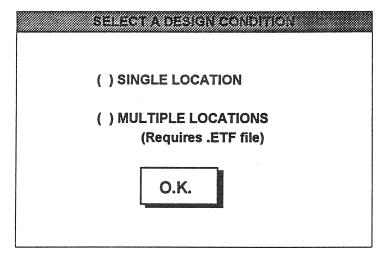


Figure 6. NEW file dialogue box

The $\underline{load\ file}$ command opens a dialog box as shown in Fig. 7 . The dialog box contains the following:

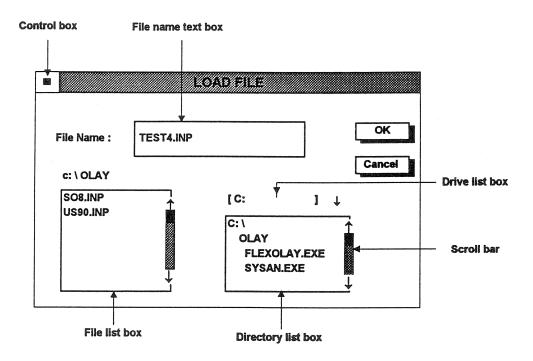


Figure 7 Load file dialog box.

- Drive list box: is the list of drives available (drive A, B, C etc..). The drives are listed when the down arrow attached is clicked. The drive can be selected by moving the mouse to the required drive name and clicking.
- Directory list box: is the list of the directories in the selected drive. The directory which contains the file to be loaded is selected by moving the mouse arrow to the required directory and then pressing the mouse button. The scroll bars attached to the box are used to scroll through the directory list by clicking on the up arrow for up movement or the down arrow for down movement.
- File list box: is the list of the files that are available in the current directory. The file to be loaded can be selected from this list box by moving the mouse pointer to the required file and then clicking. The scroll bars attached to the box are used to scroll through the file list by clicking on the up arrow for up movement or the down arrow for down movement.
- File name text box : the name of the file to be loaded is entered in this box.

Loading a file can be done by :

- directly typing the path (includes drive, directory and subdirectory) and the file name in the file name text box and then pressing the OK button. When typing the file name do not forget the extension, in this case "filename.INP".
- Selecting the drive, the directory and sub-directory, and the file name using the drive list box, the directory list box, and the file list box respectively and then pressing the OK button.

The selection between the options can be done by moving the mouse pointer to the required place (drive, directory, file, OK, Cancel, scroll bars, etc..) and pressing the mouse button. The keyboard also can be used by pressing the Tab key to move between the options (i.e. to move from the file text box to the file list etc..) and the Up and Down keys to scroll within the options.

The <u>save file</u> command opens a dialog box as shown in Fig. 8 to enter the path and the name of the file to be saved. Here also do not forget to type the extension of the file, again "filename.INP". The operations in the dialog box are the same as the ones for the load file dialog box.

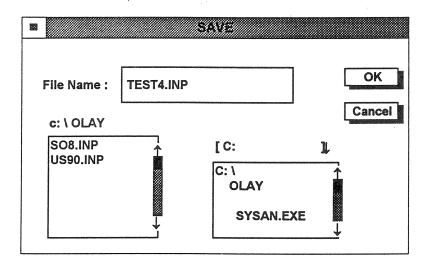


Figure 8 Save file dialog box.

When the <u>open file</u> or <u>save file</u> dialog boxes are activated only files with INP extension are listed but the program can load and run any file with any extension as long as it contains the correct format of the input data.

4.2 Data Commands:

The Data commands menu contains three sub forms: <u>Pavement</u>, <u>Soil Parameters</u> and <u>General</u>. Each screen has different control parameters which depend on the input data choices.

The <u>pavement data</u> input screen is shown in Fig. 9. Listed below are the definitions of terms used in the screen.

- Crack index: The user needs to enter a value between 0 and 5 for the crack index measured in accordance to the State of Idaho procedures. This index, however, is not used in any calculation. Thus any value will not affect the overlay design thickness.
- PAVE. TEMP. (F) : is the pavement temperature during FWD test in F.
- BS AND SBS option: the existing pavement section includes base and subbase.
- BS ONLY option : the existing pavement section includes base only.
- FULL AC option : the existing pavement section is full depth asphalt.
- E (ksi): is the modulus of the layer in ksi.

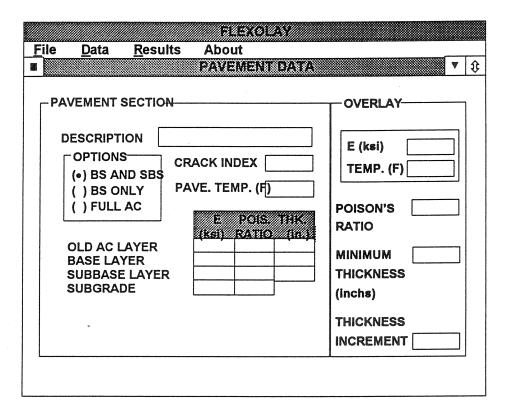


Figure 9 Pavement data screen with base and subbase included.

- POIS. RATIO : is the Poisson's ratio of the layer
- THICK. (in) : is the thickness of the layer in inches
- TEMP. (F): is the reference temperature at which the overlay modulus value was determined.
- MIN. THK. (in) : is the minimum overlay thickness required in inches.
- THK. ICR.(in): is the overlay thickness increment in inches.

The screen changes as the selected option changes (i.e., changing the option between BS AND SBS, BS ONLY and FULL AC). The base layer and the subbase layer disappear when FULL AC is selected. The subbase layer disappears when BS ONLY is selected. The data can be entered after moving the mouse pointer to the data boxes provided and pressing the mouse button. Also, the data can be entered after pressing the Tab key to move between the data boxes and the arrow keys to move between the options.

The <u>soil parameters</u> screen depends on the option selected in the pavement screen. The shape of the full screen is shown in Fig. 10. When the pavement

section includes base only, the subbase options will disappear and when the pavement section is full depth asphalt, the base and the subbase options will disappear. Listed below is the options used:

- FINE option: means that the subgrade is fine grained and stress dependent. When this options is selected the parameters K1 and K2 will appear, and it is required to enter the values in the data boxes provided.
- GRANULAR option: means that the layer is granular and stress dependent. When this options is selected, the parameters K1 and K2 will appear and it is required to enter the values in the data boxes provided.
- GRAN.[LINEAR] option: means that the layer is granular and considered as stress independent. When this option is selected, the parameters K1 and K2 will disappear.
- LINEAR option: means that the subgrade is considered as stress independent. When this option is selected, the parameters K1 and K2 will disappear.
- CEMENT T. B. option: means cement treated base. When this option is selected, the parameters K1 and K2 will disappear.
- BITUMEN T. B. option: means bitumen treated base. When this
 option is selected, the parameters Vb and Va will appear. Vb is
 the percentage bitumen volume and Va is the percentage air volume
 in the treated base. It is required to enter the values in the
 data boxes provided.

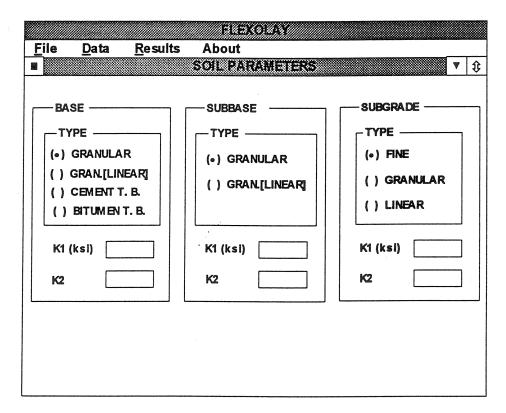


Figure 10 Soil parameters data full screen.

The options can be selected by moving the mouse pointer to required option and then pressing the mouse button. Also, the keyboard can be used by pressing the Tab key to select between the options and the up and down arrow key to select within the option.

The general data full screen is shown in Fig. 11 and it includes:

- DUAL TIRE LOAD in 1b.
- DUAL TIRE SPACING in inches.
- TIRE PRESSURE in psi.
- ESTIMATED FUTURE: is the estimated future traffic repetitions in terms of equivalent single axle load for the design period.
- PAST ESAL: is past traffic repetitions in terms of equivalent single axle load.
- INCLD. PAST TEAFFIC: check box (when empty the past traffic label and the corresponding data box will disappear)

- FATIGUE SHIFT FACTOR FOR NEW AC: a default value of 18.4 is taken for this shift factor and can be changed here by the user.
- FATIGUE SHIFT FACTOR FOR OLD AC : a default value of 15 is taken for this shift factor and can be changed here by the user.

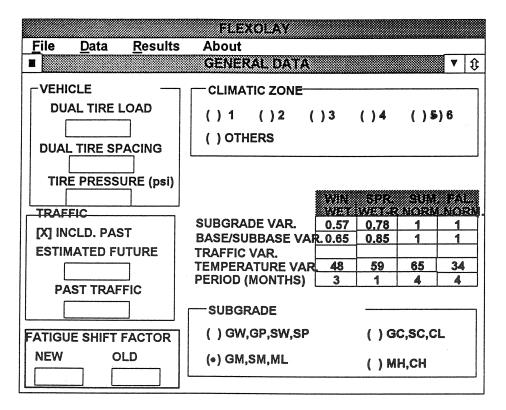


Figure 11 General data full screen.

- CLIMATIC ZONES option: is the pavement operating climate zone where the pavement section is located.
- SUBGRADE VAR. : is the seasonal subgrade modulus adjustment factor.
- BASE/SUBBASE VAR. : is the seasonal base\subbase modulus adjustment factor. (Will be disabled for full depth asphalt pavement section).
- TRAFFIC VAR. : is the seasonal variations in the traffic.
- TEMPERATURE VAR. : is the seasonal mean air temperature.
- PERIOD (MONTHS): is the period of each season in months.

• SUBGRADE CLASSIFICATION options: is the subgrade classification according to the Unified Soil Classification system. These options only show when ZONE 3 or ZONE 6 is selected.

For ZONE 1 to 6 the SUBGRADE VAR., BASE/SUBBASE VAR., TEMPERATURE VAR. and PERIOD values are loaded automatically by the program and the user can not change these values. In order to change the values, the ZONE has to be selected as OTHERS. The SUBGRADE VAR. values depend on the subgrade modulus value entered in the pavement data screen and will change by changing the modulus.

The data are entered after moving the mouse pointer to the point of interest and pressing the mouse button. The keyboard can be used by pressing the Tab key to move the cursor to the point of interest.

4.3 Result Commands:

The result commands are :

- RUN to run the program for overlay calculations at a single location, i.e. running using one set of moduli values consisting of one modulus for each layer (short cut key Ctrl+R).
- RUN FILE here the user can run multiple locations without the need for re-entering the input values more than once, see section 4.4.
- SHOW (to show the results on the screen-short cut key Ctrl+H).
- PRINT (to print the results-short cut key F7).

After the completion of data entry, selecting the RUN command will start the overlay calculations and a running message will appear. The message informs the user about the operations that are taking place and the overlay thickness in use. After the completion of the running process, a summary of the results and the required overlay thickness can be seen on the screen by selecting the show command if the performed run was for single location. Detailed results can be printed by selecting the PRINT command. A dialog box as shown in Fig. 10 will be displayed when the PRINT command is selected. This dialog box contains the following:

- Printer port options (LPT1, LPT2, LPT3): These options are selected when the results are required to be printed by a printer. The printer port to be selected is the port where the printer is connected (usually LPT1).
- File option: this option is selected when the results are required to be printed to a file.
- File name text box: When the file option is selected this box will be enabled, and it is required to enter the path and the name of the file to print the results to.

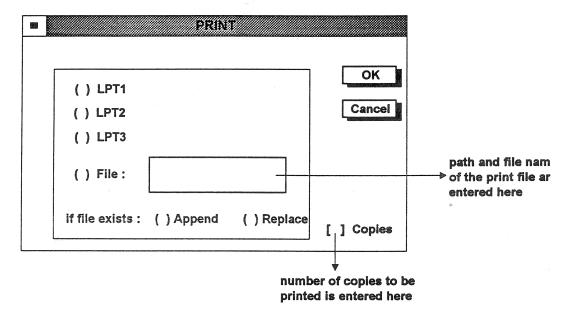


Figure 12 Print dialog box.

- Append option: this option is selected to stop the printing when a file has the same name as the name entered in the file name text box, and thus, preventing the program from replacing that file. This option only available when the file option is selected.
- Replace option: this option is selected to replace an existing file that has the same name as the one entered in the file name text box. This option is only available when the file option is selected.
- Copies: is the required number of copies to be printed.

 OK button: pressed to print the results.
- Cancel button : pressed to cancel the print command.

If the run was for multiple locations clicking the **show command** shows a message to tell the user that the output for the this run will be stored in file "filname.FLX".

4.4 RUN FILE Command:

Clicking this RESULTS Menu command calls for a file with extension .ETF which should be pre-prepared before activating this command. The ETF file is a DOS ASCII file which includes the FWD backcalculation results. It should be noted that the ETF file must be prepared separately in a format as given below:

The first row should include two inputs. In the first column the number of layers for this design excluding the new overlay. In the second column a header for this file, to make it easy for the user to identify the file. After this, each row represents a data set for a testing location (mile post. A single data set is provided in the following columns:

Column 1: pavement testing temperature

Column 2: mile post

Columns 3-6: Modului values for the existing pavement layers (in ksi). It is to be noted that if the exiting pavement is a full depth (i.e., only one layer over the subgrade), the user needs to enter only two E values (surface and subgrade) in column 3 and 4. If two layers exist on top of the subgrade, three E values (Surface, base and subgrade) will be needed and so on.

Make sure to create the EFT file under any DOS editor, otherwise you will get a runtime error stating: "Check ETF file format".

An example of a ETF file is provided in the APPENDIX B.

5. Files created by Flexolay

First: If you are running a single location design, you can view the results with the Show command under Results in the main menu. If you want to print the output straight to a printer or to a file, choose Print from the Results menu. One of the files created by FLEXOLAY is this output file which you specify as noted previously.

Second: In order to run a multiple location design, you will choose the name of the ETF file for the input of the temperature and the Moduli

values. A file with the same name but with extension .FLX will be created by FLEXOLAY for the output of this multiple location design.

Third: If you get a runtime error, FLEXOLAY will create a file with the same name as the ETF file but with extension "LOG". You will find two numbers in this file, the first number indicates the type of error you have done according to the code in appendix A. If the second number is anything but 86 reinstall FLEXOLAY.

6. Example

Two example files are provided on the distribution diskette. Example 1 for a single location (one mile post) and example 2 for a pavement section with multiple locations (multiple mile posts). Input files are with extension (*.INP). For design with multiple locations, the output is always stored in a file with extension FLX as mentioned above. The listing for an example of the output file (FLX file) is attached in Appendix B.

An example of the suggested procedures to get accurate and satisfactory results is shown in Appendix C. The example shows how to analyze the data obtained from the backcalculation program MODULUS and decide upon reliable values to use for FLEXOLAY, for either single or multiple sections.

7. Questions and Technical Assistance

Please call or send a FAX to:

Fouad Bayomy (208) 885-6784 FAX (208) 885-6608

Appendix A List of Errors and Possible Solutions

ERROR NUMBER	POSSIBLE SOLUTION(S)
7	 If you are running the program from the A drive, copy the program into a sperate directory in the C drive and try running it from there. Divid your ETF file into two or more parts and try running each one alone. Check system configurations.
14	You have specified a long file name.
25, 57, 68	• Check the drive you are trying to read from.
52, 64	Bad file name.
53	• File not found.
61	Disk full.
70, 71	Make sure the floppy disk is not write protected.
75, 76	• Invalid path for the file in use.
342	Your ETF file is too large.

Appendix B

Example of an ETF File and the Corresponding Output FLX File

iding overlay)

(exclud	,													
Example of ETF file for with 4 moduli values (exclud	3.3	2.9	3.9	3.2	2.9	2.8	2.6	2.5	2.5	2.6	2.7	4.2	6.1	6.3
with 4 mod	87.8	87.7	116.2	95.2	86.3	83.7	77.4	20.6	59.2	76.7	70.7	125.2	0.96	77.0
file for	92.4	252.1	190.6	154.5	186.1	144.2	164.2	239.5	254.9	223.2	267.2	0.86	42.3	143.2
of ETF	281.	857.	336.	382.	427.	360.	618.	756.	765.	755.	811.	284.	249.	200.
Example	454.500	454.600	454.700	454.800	454.900	455.000	455.000	455.100	455.200	455.300	455.400	455.500	455.600	455.712
4	101	102	103				106		108		109	109	110	pared pared

INPUT FILE: EXAPPB.INP

DESCRIPTION: Example: to be run with ETF in Appendix B

1. SUMMARY OF INPUT DATA

1.1 TRAFFIC DATA

DESIGN DUAL TIRE LOAD = 4500
DESIGN DUAL TIRE SPACING = 13.5
TIRE PRESSURE (psi) = 80
DESIGN FUTURE TRAFFIC (ESALs) = 4000000
ESTIMATED PAST TRAFFIC (ESALs) = 0
FATIGUE SHIFT FACTOR FOR NEW ASPHALT = 18.4
FATIGUE SHIFT FACTOR FOR OLD ASPHALT = 8

1.2 SEASONAL VARIATION DATA

[W	WINTER	SPRING	SPRING SUMMER FALL	FALL
SUBGRADE VARIATION	0.44	0.72	1.00	1.00
BASE/SBASE VARIATION	0.65	0.85	1.00	1.00
TRAFFIC VARIATION	1.00	1.00	1.00	1.00
TEMPERATURE VARIATION	48.00	59.00	65.00	34.00
PERIOD (MONTHS)	3.00	1.00	4.00	4.00

1.3 PAVEMENT DATA

2.5	9	WD TEST $= 0$	OLUME (Vb) $\% = 11$	E(Va)% = 5
CRACK INDEX =	CLIMATIC ZONE:	TEMPERATURE AT FWD TEST	OLD AC BITUMEN VOLUME (Vb) $\% = 11$	OLD AC AIR VOLUME (Va) %

THICKNESS POISSON RATIO

TO (in.)	03	05.50	08.80	SEMI-INFINITE
RATIO	0.20	0.35	0.40	0.45
	OLD AC LAYER	BASE LAYER	SUBBASE LAYER	SUBGRADE

SUBGRADE TYPE: LINEAR

BASE TYPE : LINEAR SUB-BASE TYPE : LINEAR

OVERLAY MODULUS(ksi) = 350 AT TEMPERATURE (F) = 77

POISSON RATIO = .2 MINIMUM THICKNESS = 2 BITUMEN VOLUME (Vb) % = 11 AIR VOLUME (Va) % = 5

ETF FILE: EXAPPB.ETF

Example of ETF file for with 4 moduli values (excluding overlay)

DAMA22	ED-400-400-400-400-400	0	, 0	0	0	0	0	0	0	0	0	0	0
DAMA4	9	9893	84948	.59307	.93573	.85059	806	.9373	.81145	.97203	.90534	.8239	.72722
DAMA3	9-9-9-8	0	0	0	0	0	0	0	0	0	0	0	0
DAMA2		.20522	.04812	.03526	.08011	.05104	.08082	.08458	.04323	.04297	.05368	.03815	.21253
DAMA1		.00156	.00523	.0000	.0000	.00005	.00002	.00063	.00191	.00219	.00247	.00314	.00119
OVERLAY	Charlest Confession	m	7	2	2.5	٣	3.5	3.5	3.5	3.5	٣	٣	7
E4 0	***************************************	3.3	2.9	3.9	3.2	2.9	2.8	2.6	2.5	2.5	2.6	2.7	4.2
E3	***************************************	8.76	87.7	116.2	95.2	86.3	83.7	77.4	70.6	59.2	7.97	70.7	125.2
E2	0000000	92.4	252.1	190.6	154.5	186.1	144.2	164.2	239.5	254.9	223.2	267.2	86
El		281	857	336	382	427	360	618	756	765	755	811	284
TEMPERATURE		101											
MILE POST		454.5	454.6	454.7	454.8	454.9	455	455	455.1	455.2	455.3	455.4	455.5
CASE	0.000		7	٣	4	\$	9	7	00	6	10		12

13	455.6 455.712	110	249	42.3 143.2	96	6.1	5 3	.01494	.87363	0 0	.88567
DAMA	DAMA1 = FATIGIE	DAMAGE ON OVERLA	N OVERLA	>							

00

DAMAI = FAIIGUE DAMAGE ON OVEKLAY
DAMA2 = FATIGUE DAMAGE ON OLD AC
DAMA3 = FATIGUE DAMAGE ON BTB
DAMA4 = RUTTING DAMAGE
DAMA22 = FATIGUE DAMAGE

Appendix C

Example of Suggested

Method of Analysis

APPENDIX C

Example of Suggested Method of Analysis

A suggested method for analyzing the FWD data to get the moduli values of the different layers and use them to create an .INP file for FLEXOLAY is presented here. FWD tests made on US-30, from milepost 447.00 to 455.00, were used. MODULUS backcalculation program was used to assist in obtaining E values. The following procedures were made twice, once for the FWD data made before an overlay was placed and the other time for the FWD data after the overlay was constructed.

Concept:

To determine the required overlay thickness, the backcalculated E values from FWD data using Modulus program were analyzed to establish representative E values for each pavement section. Then these E values were used in FLEXOLAY program for single design case to design an overlay for each section.

- Step 1: A run of MODULUS was made for the hole part of the road under study, and the variations of the moduli values were plotted. Also the variation of the last deflection, D7, was plotted. This was done for FWD data before the construction of the overlay (pre-construction).
- Step 2: By analyzing the variation of E values and D7, the road was divided into three sections. The first section was identified from mile-post 447.00 to 449.50. The second was identified from milepost 450.50 to 454.00. Finally the third section was from mile-post 454.50 456.00.
- Step 3: MODULUS program was used again separately for each section. Several runs were made with different seed values until the most satisfactory values were obtained. This step is done to refine the data file by eliminating data points with outliers. This step involves engineering judgment and is dependent on the pavement designer experience.
- Step 4: The 87.5 percentile values of the moduli were calculated to be used later as input in the FLEXOLAY program.
- Step 5: The E values obtained from step 4 along with all other necessary inputs were used to create the input file for FLEXOLAY (.INP). The thicknesses of the required overlay were obtained for all three sections.
- Step 6: The above 5 steps were repeated for FWD data made after the construction of the overlay (post-construction).

Results of the above analysis revealed the following overlay thicknesses:

Section	Overlay Thickness	Overlay Thickness
-	(Free constanted and	(Post-construction)
	6.5	5
2	5	3
3	6	5

As noticed the average overlay thickness for the original pavement section (pre-construction) is 5.8". The procedure indicated 4.33" still needed for the assumed traffic and design life. It is to be noted that for this particular pavement section, the existing overlay is 3.75" which is about 2" smaller than the needed one at the time of construction. Flexolay, however, predicted a need of additional 4.33" on to be added to new overlay. This makes a difference of almost 50%. It is believed that this difference is attributed to the shift factors used and inherited variability in backcalculated E values from FWD results.

If the variation of the overlay with the milepost is required prepare .ETF files (as was shown in Appendix B) for FLEXOLAY for each section, pre-construction and post-construction. Run FLEXOLAY and compare the overlays of pre-construction and post-construction at the different mileposts.

The next few pages are the outputs of MODULUS that were used in FLEXOLAY for the pre-construction case only.

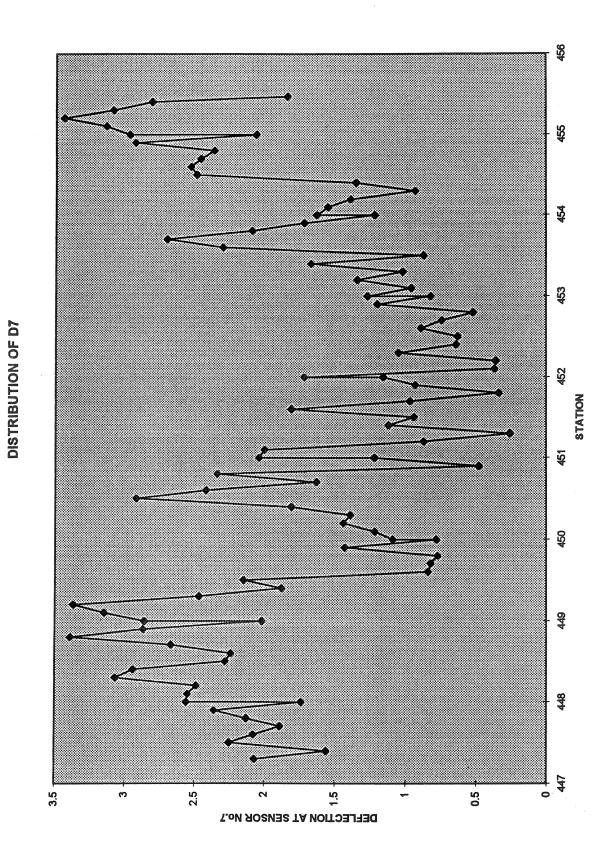
	MODUL	US ANAL	YSIS	MODULUS ANALYSIS SYSTEM (S	(SUMM)	ARY RE	POR	D) (Ver	UMMARY REPORT) (Version 4.2)							
District: Temp. : Highway/Road:	š 8	5 105 US030	0	B B S	Thi Pavement H1: Base: H2: Subbase: H3: Subparade H4:	Thickness(in) H1: H2: H3: H4: 5	ess(ir	23.52	MODULI Minimum 200,000 40,000 10,000	RANGE(psi) Maximum 2,000,000 800,000 150,000	(is		-	Poisson Ratio Values 0.35 0.35 0.45	L &	Absolute
	70000000000	***********				800000000000		400000)	Calculated	þ		ă	Doth
		Load		Measured Deflectio		(mils):						Moduli values		(ksi):	\$ \$	
Station	(Ips)	R1	R2	R3	9000	R4	R5	15	R6	R7	(E1) ((E2) ((E3)	(E4)	ERR/Sens Bedrock	drock
447.3	11,881	181 25.33	က	20.62	16.77	11.74	4	8.22	4.2	2.07	810	209	17.9	2.7	5.52	76.57
447.4	11,817	11.22	7	8.15	6.14	4.05	S.	2.94	2	1.56	869	110.2	150	5.9	2.2	95.77
447.5	11,877		တ	10.08	8.29	6.1	_	4.61	3.25	2.25	1134	389.5	92.5	3.9	3.14	99.07
447.6	11,714		ক	10.64	8.54	6.02	2	4.53	3.11	2.08	734	238.9	109.2	3.6	1.53	96.12
447.7	11,936		~	8.52	6.65	4.65	2	3.37	2.44	1.89	698	203.8	149.4	S	2.46	117.92
447.8	11,694	~	ന	13.46	10.42	7.18		5.49	3.54	2.13		293.8	82.1	3.3	1.73	87.63
447.9	11,786		တ	12.2	9.77	7.11		5.57	3.85	2.36		211.6	90.6	ന	2.45	86.57
448	8,385		မွ	12.67	9.72	6.72		5.05	3.14	1.74		261.3	53.8	2.6	1.91	84.71
448	11,658		7	16.97	13.3	9.5		7.24	4.6	2.56		244.9	57.4	2.4	.	84.1
448.1	11,722		ന	14.86	11.41	8.18		6.48	4.5	2.55		90.1	73.4	2.7	3.59	82.73
448.201	11,738		2	12.46	10.37	7.63		5.87	3.94	2.49		318.7	72.2	3.2	4.84	90.68
448.3	11,658		2	13.37	11.37	8.49		6.78	4). ©	3.07		276	64.3	2.9	8.32	93.71
448.404	11,563		7	20.33	16.18	11.75		8.98	5.66			191.4	57.4	6.	2.13	83.43
448.5	11,714		2	12.26	9.53	6.89		5.43	3.86		_	152.3	94.2	€.	3.64	83.16
448.6	11,408		4	14.58	11.78	8.91		96.9	4.42			252	62.7	2.5	2.6	77.56
448.705	11,611		7	13.52		8.28		6.36	4.35			192.9	79.2	2.6	2.9	89.16
448.8	11,591	. 4	ಌ	16.43	13.26	8.8		7.78	5.56			231.5	58.7	2.3	4.09	89.47
448.9	11,611		©	13.65	11.07	8.31		6.63	4.74			249.6	74.4	2.6	4.04	86.39
449	8,306		∞	11.31	9.26	8.		5.19	3.54			246.2	58.2	2.5	3.59	85.43
449	11,631		ব	15.09	12.52	9.5		7.35	5.09			257.1	90	2.6	6.59	82.67
449.1	11,579	79 18.84	4	14.81	12.07	9.16		7.33	5.15		772	260	58.9	2.6	5.59	87.84
449.2	11,269	N	S	16.64	13.4	9.93		7.28	5.27	7.		225.6	53.9	2.3	2.1	95.64
449.303	11,360	17.3	က	13.61	10.97	7.7		5.99	4.2	2.47		231.9	80.2	2.7	2.03	87.05
449.401	11,265	65 16.06	9	13.35	11.18	8.04		5.59	3.65	1.88	88 33	294.3	62.8	2.9	3.04	80.66

81.65	70.37	66.56	69.26	83.97	75.01	73.02	82.78	76.51	79.44	79.44	83.84	81.7	82.15	85.96	99.99	76.56	77.87	83.88	72.59	61.22	72.98	71.03	72.97	70.48	65.46	74.36	82.69	81.57	65.2	62.7	77.28	65.08	65.65	69.37	67.27	66.36
1.79	2.98	5.82	3.41	14.15	1.75	1.63	1.35	1.56	1.97	2.1	6.98	2.42	2.44	2.05	6.37	7	2.35	1.78	0.79	5.06	3.16	17.88	10.18	3.89	3.29	5.08	1.69	1.98	2.42	3.21	2.41	4.91	4.31	3.43	4.13	2.23
က	ဖ	6.9	7.4	7	4 .9	4 . 80.	5.7	3.9	4.5	3.7	2.8	2.4	4.1	2.7	5.6	3.1	2.8	3.3	6.7	6.6	4.5	7.2	3.9	3.7	9.2	5.8	3.9	3.8	13.5	13.1	5.9	9.9	œ T.	6.1	7.7	9.1
89.4	45.3	27.6	15.2	33.5	102.2	123.6	111.8	118.4	109.9	109.6	65.7	71.1	108.3	66.7	12.6	74.4	82.6	83.2	79	50.9	40.5	10	90.3	32.7	67.1	118.3	115	114.3	54.6	145.9	122.6	70.9	33	9/	88.7	27.9
230.1	600.2	690.5	743.9	40	335.3	353.1	129.9	251.9	450.6	239.5	278.3	222.2	408.8	271	502.8	308.6	274.8	330.6	665.1	800	445.5	133.5	388.9	365.9	800	308.9	188.4	187.4	800	800	587.9	662.4	610.8	531.8	448.2	89.1
511	378	2000	1200	2000	256	293	618	429	492	099	841	454	958	9/9	1692	414	519	886	641	388	290	2000	1167	1048	386	200	304	449	593	316	261	245	2000	1833	2000	1965
2.15	0.84	0.82	0.77	1.43	0.78	1.09	1.22	1.44	1.39	1.81	2.92	2.42	1.63	2.34	0.48	1.22	2.04	7	0.87	0.26	1.12	0.94	1.89	0.97	0.34	0.93	1.16	1.72	0.37	0.36	1.05	0.64	0.63	0.89	0.74	0.52
3.76	1.67	1.7	1.48	2.36	1.59	2.28	1.96	2.8	2.46	3.14	4.87	4.44	2.61	3.95	2.07	2.56	3.83	3.33	1.66	0.85	2.28	2.17	3.39	ന	1.03	8.	1.99	2.89	0.68	0.72	1.85	1.39	4.	1.89	1.38	1.08
5.49	3.34	3.31	2.62	3.66	2.72	3.76	3.11	4.21	3.97	4.57	6.86	7.05	4.14	6.26	4.43	4.13	6.26	5.08	2.85	2.12	4.52	4.15	5.22	5.53	2.18	3.22	3.18	4.57	1.39	1.49	3.18	3.1	2.76	3.25	2.55	2.23
7.29	4.97	4.74	4.77	5.04	3.83	5.24	4.41	5.69	5.44	5.96	8.5	9.32	5.46	8.55	6.27	5.49	7.88	6.91	4.31	3.48	6.73	6.26	6.41	7.6	3.44	4.74	4.25	5.98	2.57	2.34	4.5	4.7	3.99	4.43	3.6	3.67
9.91	8.03	6.58	7.22	7.64	2.67	7.52	6.63	8.09	7.75	8.18	11.01	12.43	7.43	11.57	8.85	7.8	10.69	9.32	6.22	5.66	10.52	8.88	8.03	10.65	5.66	7.13	6.1	8.22	4.51	3.86	6.89	7.21	5.75	6.09	5.19	6.41
12.55	10.89	8.06	9.17	10.31	7.59	9.83	60.6	10.22	9.81	10.47	13.47	15.42	9.13	14.43	10.8	10.02	13.78	11.46	8.43	7.87	13.99	11.03	9.22	13.26	7.69	9.46	8.01	10.68	6.22	5.27	8.85	9.68	7.18	7.44	6.45	9.64
16.61	14.83	9.94	7	12.66	10.83	13.84	12.66	13.96	12.9	13.84	16.87	20.17	11.73	18.32	13.44	12.85	17.32	14.5	11.05	11.6	19.25	13.96	11.42	17.31	11.13	14.55	11.24	14.85	9.1	8.31	12.78	14.31	9.33	9.61	8.42	12.09
11,293	11,269	11,364	11,364	11,583	8,174	11,464	11,353	11,293	11,547	11,480	11,452	11,337	11,349	11,337	11,464	8,214	11,444	11,448	11,460	11,547	11,400	11,488	11,436	11,388	11,444	11,412	8,099	11,432	11,571	11,400	11,388	11,384	11,444	11,468	11,547	11,416
449.5	449.6	449.704	449.8	449.9	450	450	450.1	450.2	450.301	450.4	450.5	450.6	450.7	450.801	450.9	451	451	451.1	451.201	451.301	451.403	451.5	451.601	451.7	451.8	451.902	452	452	452.1	452.2	452.3	452.401	452.5	452.6	452.7	452.8

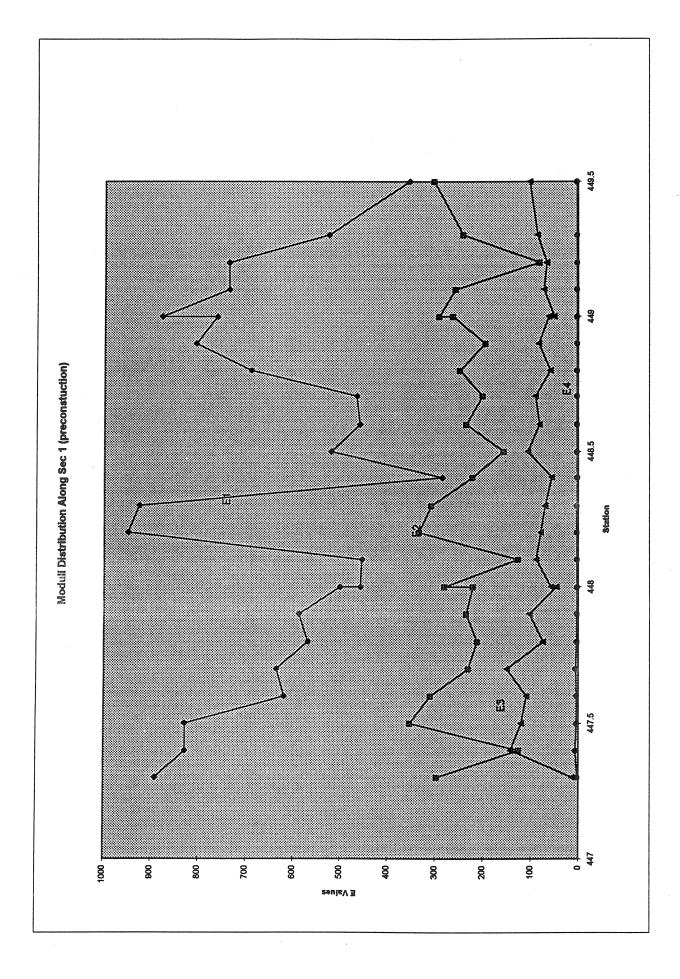
453 7800 890 765 614 4.24 2.65 172 082 445 4.54 4.24 2.65 172 084 4.35 4.24 2.56 172 884 4.23 178 4.23 178 4.24 4.24 4.25 172 884 4.24 4.25 1.76 1.77 884 4.24 4.23 1.74 188 6.25 2.09 0.96 8.28 24.77 8.95 2.7 4.15 1.75 4.15 1.77 884 8.24 4.24 2.55 1.27 884 4.24 4.28 2.09 0.96 8.08 2.4 4.15 1.17 884 4.24 4.24 2.55 1.27 1.87 1.14 1.16 8.07 1.16 8.09 2.09 9.09 8.09 2.07 1.42 4.24 2.55 1.24 4.24 2.55 1.24 4.24 2.55 1.24 4.23 1.14 4.23 4.24 2.14 <t< th=""><th>452.9</th><th>11,368</th><th>13.93</th><th>9.95</th><th>7.81</th><th>5.42</th><th>3.91</th><th>2.3</th><th>1.2</th><th>287</th><th>468.4</th><th>117.2</th><th>4.7</th><th>2.36</th><th>76.96</th></t<>	452.9	11,368	13.93	9.95	7.81	5.42	3.91	2.3	1.2	287	468.4	117.2	4.7	2.36	76.96
53.1 11.309 13.15 10.13 8.24 5.9 4.24 2.55 127 884 4.25 2.59 127 4.24 2.59 127 4.15 4.2 2.5 12.7 88.9 5.2 2.33 3.5 5.2 2.39 3.5 2.5 3.8 4.15 3.6 2.5 3.8 4.1 4.1 8.8 5.2 2.3 3.5 2.1 4.1 8.8 5.2 2.3 4.15 2.2 2.3 3.7 4.15 3.5 3.1 3.6 2.1 4.1 8.8 5.7 3.6 2.1 4.1 8.8 5.2 3.7 4.15 8.7 8.2 4.1 4.1 8.7 8.2 4.2 4.2 4.2 4.2 4.1 8.7 8.2 4.1 8.7 4.1 8.7 8.2 4.1 8.2 4.1 4.2 4.1 8.2 3.2 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1<	453	7,960	9.99	7.65	6.14	4.24	2.95	1.72	0.82	822	445.4	53.6	4.5	2.6	75.82
53.1 11,389 12.35 947 7.04 487 3.62 2.09 0.98 6.247 88.9 5.2 2.33 53.2 11,273 16.37 16.37 16.37 16.25 7.66 5.14 3.09 1.34 108 86.9 5.2 2.33 53.4 11,273 16.37 16.37 16.47 8.06 5.14 3.09 1.34 108 8.03 3.4 4.15 2.3 4.16 8.0 5.2 4.16 8.0 5.2 4.16 8.0 5.17 4.16 8.0 5.1 4.16 8.0 5.2 4.16 8.0 5.0 7.0 4.16 8.0 7.0 4.16 8.0 7.1 4.16 8.0 7.1 4.16 8.0 7.1 4.16 8.0 7.1 4.1 8.0 8.0 7.1 4.1 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	453	11,309	13.15	10.13	8.24	5.9	4.24	2.55	1.27	884	423	74.5	4.2	2.87	75.26
55.2 11,293 15.37 12.62 7.66 5.14 3.09 1.34 1108 36.9 3.7 4.16 36.9 3.7 4.16 36.9 3.7 4.16 36.9 3.7 4.16 36.9 3.7 4.16 36.2 3.8 3.7 4.16 36.2 4.17 6.7 2.8 4.17 6.7 2.8 4.16 3.8 3.7 4.16 3.8 3.7 4.16 3.8 3.7 4.16 3.8 3.7 4.16 3.8 3.7 4.16 3.8 3.7 4.16 3.8 3.7 4.16 6.7 4.2 1.08 3.8 3.7 4.16 3.8 3.1 4.16 3.1 4.16 3.1 4.16 3.1 4.16 3.1 4.1 4.2 <td>153.1</td> <td>11,396</td> <td>12.35</td> <td>9.47</td> <td>7.04</td> <td>4.87</td> <td>3.62</td> <td>2.09</td> <td>0.96</td> <td>828</td> <td>247.7</td> <td>88.9</td> <td>5.2</td> <td>2.33</td> <td>70.7</td>	153.1	11,396	12.35	9.47	7.04	4.87	3.62	2.09	0.96	828	247.7	88.9	5.2	2.33	70.7
53.3 11,223 15,57 11,17 8.38 5,57 3,87 2,19 102 224 487,9 87 4,9 1,96 53.4 11,223 11,22 13,69 11,14 81,6 607 3,67 1,19 86 201,7 65 3,33 53.5 11,22 14,68 11,29 11,14 81,6 607 3,67 1,19 86 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.3 3.3 10.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3 40.8 5.2 2.3	153.2	11,273	15.37	12.62	10.52	7.66	5.14	3.09	1.34	1108	369.3	36.9	3.7	4.15	74.36
53.4 11,22 13.69 11.14 6.07 3.67 1.67 846 201.7 66.7 2.8 3.33 53.5 11,322 14.85 11.29 8.76 5.63 3.65 2.1 108 50.7 2.1 40.8 50.1 6.6 2.2 1.6 3.7 4.1 6.7 2.8 3.3 4.6 5.0 1.6 1.8 5.7 4.1 2.3 4.0 5.2 1.6 4.2 2.0 8.6 2.9 4.6 5.0 8.6 2.9 4.6 1.0 2.1 4.2 2.0 8.6 2.0 4.6 1.0 2.1 4.2 2.0 8.6 2.0 4.2 2.0 8.6 2.0 3.2 4.2 1.0 4.2 2.0 8.6 2.0 4.2 2.0 8.6 2.0 4.2 2.0 8.6 2.0 3.2 4.1 4.2 2.0 8.6 2.0 4.2 2.0 8.6 2.0 4.	453.3	11,293	15.87	11.17	8.38	5.57	3.87	2.19	1.02	224	487.9	87	4.9	1.96	74.97
53.5 11,372 14.85 11.29 8.76 56.3 3.65 2.1 0.87 599 520.3 40.8 5.2 1.64 1.73 17.71 14.14 1.18 8.78 6.22 4.15 2.3 749 56.8 2.3 4.6 5.2 5.4 1.6 6.2 4.15 5.2 4.15 6.2 4.21 6.4 6.9 2.3 4.6 6.2 2.4 1.6 6.2 2.4 1.6 6.2 2.4 1.6 6.2 2.4 1.6 6.2 2.4 1.6 6.2 2.4 1.6 6.2 2.4 1.6 6.2 2.4 1.6 6.2 2.3 4.2 1.6 6.2 2.4 1.6 6.2 2.3 4.2 1.6 6.2 2.4 1.7 2.2 2.2 4.2 1.7 4.2 2.1 4.2 2.1 4.2 2.1 4.2 2.1 4.2 2.1 4.2 2.1 4.2 2.2 <th< td=""><td>153.4</td><td>11,253</td><td>17.22</td><td>13.69</td><td>11.14</td><td>8.16</td><td>6.07</td><td>3.67</td><td>1.67</td><td>846</td><td>201.7</td><td>65.7</td><td>2.8</td><td>3.33</td><td>75.4</td></th<>	153.4	11,253	17.22	13.69	11.14	8.16	6.07	3.67	1.67	846	201.7	65.7	2.8	3.33	75.4
5.3.6 11,233 17,71 14,14 11,78 8.78 6.22 4,15 23 749 264,1 63.2 2.6 2.34 8.04 11,452 15,43 12,63 12,7 42,1 5.05 2.7 44,2 186,4 61.9 2.1 261 8.04 11,452 15,43 12,93 17,06 13,87 16,54 7.57 5.25 3.89 2.57 17,2 528 272.7 14,48 4.3 1.39 454 11,289 12,93 9.76 7.57 5.25 1.84 1.22 38.7 1.48 4.3 1.44 1.2 2.3 1.44 1.2 2.3 1.44 1.2 2.3 1.44 1.2 2.3 1.44 1.4	453.5	11,372	14.85	11.29	8.76	5.63	3.65	2.1	0.87	599	520.3	40.8	5.2	1.64	74.15
7.02 11,186 22.55 17.06 13.87 10.54 7.91 5.05 2.7 442 1864 61.9 2.1 2.61 8.04 11,452 15.43 12.99 11.08 8.57 6.7 4.21 2.09 863 287.5 66.8 2.9 757 714. 9.01 11,269 12.93 9.76 7.57 5.25 3.89 2.57 17.2 5.26 272.7 114.9 4.2 2.31 13.9 4.4 4.2 2.31 14.30 15.9 10.96 8.64 4.5 3.15 1.84 1.22 5.6 421.5 71.4 4.2 2.31 14.30 15.9 10.96 8.68 5.75 4.13 2.52 11.84 1.22 5.6 421.5 71.4 4.2 2.31 14.30 10.31 16.5 8.64 6.4 6.4 6.4 11.32 16.9 10.32 11.34 11.37 16.3 11.39 10.34 11.39 1	453.6	11,233	17.71	14.14	11.78	8.78	6.22	4.15	2.3	749	264.1	63.2	2.6	2.34	83.12
1,000 1,00	3.702	11,186	22.55	17.06	13.87	10.54	7.91	5.05	2.7	442	186.4	61.9	2.1	2.61	82.1
901 11,269 12,93 9.76 7.57 5.25 3.89 2.57 1.72 528 272.7 114,9 4.3 1.39 4.4 4.3 1.39 4.4 4.2 2.57 4.7 4.2 3.7 4.4 4.2 2.52 1.58 2.6 4.4 4.7 4.2 2.5 1.6 4.4 4.7	3.804	11,452	15.43	12.99	11.08	8.57	6.7	4.21	2.09	863	287.5	8.99	2.9	7.57	75.82
454 8,107 11.57 8.52 6.69 4.5 3.15 1.84 1.22 356 421.5 71.4 4.2 2.37 8 454 11,332 15.08 10.76 8.54 5.97 4.27 2.59 1.63 248 477.1 182. 4.2 2.11 8 4.2 1.1337 15.9 10.96 8.68 5.75 4.13 2.52 1.65 248 477.1 182. 4.2 2.11 8 4.2 2.11 8 4.3 2.52 1.35 246 4.13 1.392 15.08 8.15 6.46 4.64 3.37 1.89 0.93 286 425.6 150 5.5 3.46 2.45 11.392 11.293 11.71 8.99 6.75 4.69 3.42 2.13 1.35 1465 13.41 105.1 5.1 163 5.6 3.46 11.237 16.93 11.71 10.83 8.23 6.41 4.13 1.35 16.83 13.95 10.57 7.88 6.09 4.12 2.49 331 98.1 82.7 2.8 4.81 8.4 81 8.4 81 11.237 16.39 11.20 10.43 8.23 6.41 4.19 10.49 8.68 6.02 5.26 3.83 2.46 8.45 6.99 2.6 5.96 8.4 81 8.23 14.11 11.77 8.97 7.08 4.89 2.93 785 264.5 69.9 2.6 5.96 4.55 11.237 16.23 18.75 14.43 12.17 8.97 7.88 5.40 2.93 785 264.5 69.9 2.6 5.96 4.55 11.237 16.23 18.75 14.43 12.17 8.87 7.88 5.40 2.93 785 264.5 69.9 2.6 5.96 4.25 11.237 16.23 18.75 14.43 12.17 8.87 7.88 5.40 2.93 785 264.5 69.9 2.6 5.96 4.25 11.237 18.19 10.49 8.68 6.62 5.26 3.59 2.09 6.76 221.5 66.3 2.3 3.96 8.45 11.237 18.19 13.81 10.2 8.49 7.88 5.40 7.85 8.2 2.4 6.12 8.2 2.4 6.12 8.2 2.4 11.247 10.2 2.49 11.247 10.2 2.49 11.247 10.2 2.49 11.247 10.2 2.49 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.247 10.2 2.90 11.24 2.90 11.247 10.2 2.90 11	3.901	11,269	12.93	9.76	7.57	5.25	3.89	2.57	1.72	528	272.7	114.9	4.3	1.39	92.12
454 11,392 15.08 10.76 8.54 5.97 4.27 2.59 1.63 248 417.1 118.2 4.2 2.11 8 54.1 11,337 15.9 10.96 8.68 5.75 4.13 2.52 1.55 200 435.8 112.4 4.4 2.17 8 54.2 11,332 1.59 10.96 8.68 5.75 4.13 2.52 1.55 10.06 4.32 1.07 4.32 1.17 4.32 1.10 2.48 1.12 1.06 4.25 1.00 4.35 1.00 4.32 1.00 4.35 1.00 4.35 1.00 3.46 3.27 1.00 4.32 1.00 4.35 1.00 4.35 1.00 4.32 1.00 4.35 1.00 4.35 1.00 3.46 4.31 1.05 1.00 4.32 1.00 4.32 1.00 4.35 1.00 4.35 1.00 4.35 1.00 4.32 1.00 4	454	8,107	11.57	8.52	69.9	4.5	3.15	1.84	1.22	356	421.5	71.4	4.2	2.37	80.68
54.1 11,337 15.9 10.96 8.68 5.75 4.13 2.52 1.55 200 435.8 112.4 4.4 2.17 54.2 11.395 14.19 10.43 8.27 5.76 4.19 2.48 1.39 346 422.1 107.6 4.3 2.59 7.402 11,396 14.19 10.43 8.27 5.76 4.19 2.48 1.39 346 422.1 107.6 4.3 2.59 7.402 11,293 11.71 8.99 6.75 7.88 6.09 4.12 2.43 11.65 134.1 105.1 5.1 16.3 8.2	454	11,392	15.08	10.76	8.54	5.97	4.27	2.59	1.63	248	417.1	118.2	4.2	2.11	82.05
54.2 11,396 14.19 10.43 8.27 5.76 4.19 2.48 1.39 346 432.1 1076 4.3 2.59 7 54.3 11,392 12.28 8.15 6.46 4.64 3.37 1.89 0.93 286 425.6 150 5.6 3.46 7 402 11,293 11.71 8.99 6.75 4.69 3.42 2.13 1.35 1165 134.1 105.1 5.1 163 8 54.3 11,392 12.28 8.15 6.46 4.64 3.37 1.89 0.93 286 425.6 150 5.6 3.46 7 54.0 11,293 11.71 8.99 6.75 4.69 3.42 2.13 1.35 1165 134.1 105.1 5.1 163 8 54.6 11,237 16.93 13.11 10.83 8.23 6.41 4.3 2.53 790 250.6 72.6 2.84 8 54.8 11,412 16.26 12.65 10.32 7.73 5.98 4.01 2.36 854 295.6 6.99 3 2.87 8 54.9 11,368 18.23 14.1 11.77 8.97 7.08 4.89 2.93 785 264.5 69.9 3 2.87 8 55.1 11,425 18.75 14.43 12.17 9.45 7.59 5.2 2.97 691 255.1 58.5 2.6 7.85 8 55.1 11,257 20.53 15.47 12.94 9.89 7.88 5.47 3.14 677 235.8 53.3 2.4 6.12 8 55.3 11,110 23.13 18.19 10.2 8.22 5.8 3.09 591 109.7 59 2.44 8 55.4 11,281 19.69 15.36 12.9 9.77 7.65 4.94 2.81 721 244 54.4 2.4 5.3 8 55.4 11,281 19.69 15.36 12.9 9.77 7.65 4.94 2.81 721 244 54.4 2.4 5.3 8 55.4 11,102 25.96 15.92 10.67 6.73 1.73 30.8 76 4.15 21.2 2.61 7.15 1.10 2.5 3 3.11 2.63 2.13 1.73 30.8 76 4.15 21.2 2.61 7.15 1.10 2.5 3.9 2.14 8.10 2.3 3.11 2.63 2.13 1.73 30.8 4.15 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1	454.1	11,337	15.9	10.96	8.68	5.75	4.13	2.52	1.55	200	435.8	112.4	4.4	2.17	85.58
54.3 11,392 12.28 8.15 6.46 4.64 3.37 1.89 0.93 286 425.6 150 5.6 3.46 7.402 11,293 11,71 8.99 6.75 4.69 3.42 2.13 1.35 1165 134.1 105.1 5.1 1.63 8.50 10.57 7.88 6.09 4.12 2.49 331 98.1 82.7 2.8 4.81 8.70 11,295 11,291 11,102 10.12 7.22 5.56 3.63 7.90 250.6 72.6 2.84 8.81 8.70 11,186 14.34 12.02 10.12 7.22 5.56 3.83 2.46 842 31.18 77.6 3.1 4.92 8.48 11,186 14.34 12.02 10.12 7.22 5.56 3.69 8.40 2.93 785 264.5 5.99 3 2.87 84.1 11,186 14.49 8.88 6.62 5.26 3.59 2.06 6.76 221.5 65.3 2.3 3.96 8.45 11,257 20.53 15.47 12.94 9.89 7.88 5.47 3.14 677 235.8 53.5 2.4 6.12 8.55 11,110 23.13 18.19 10.2 8.22 5.8 3.44 679 226.3 55.3 2.3 7.12 8.55 11,110 23.13 18.19 10.2 8.22 5.8 3.44 679 226.3 55.3 2.3 7.12 8.55 11,110 23.13 18.19 10.2 8.28 8.18 5.55 3.09 591 10.97 5.9 8.24 8.55 11,110 23.13 18.19 10.2 8.29 8.18 5.55 3.09 591 10.97 5.9 8.24 8.53 2.3 3.00 11.84 200 40.85 11.85 11.85 11.85 11.85 11.85 11.85 11.85 11.85 11.85 11.85 11.85 11.85 11.8	454.2	11,396	14.19	10.43	8.27	5.76	4.19	2.48	1.39	346	432.1	107.6	4.3	2.59	79.03
-402 11,293 11,71 8.99 6.75 4.69 3.42 2.13 1.35 1165 134.1 105.1 5.1 16.3 8.83 1.65 134.1 105.1 5.1 1.63 8.83 4.12 2.49 331 98.1 8.77 2.8 4.81 8.82 8.84 8.82 8.84 8.85 8.82 8.84 8.85 8.85 8.86 8.87 8.86 8.86 8.86 8.86 8.86 8.86 8.87 8.87 8.87 8.86 8.86	454.3	11,392	12.28	8.15	6.46	4.64	3.37	1.89	0.93	286	425.6	150	5.6	3.46	71.16
502 10,955 20.83 13.95 10.57 7.88 6.09 4.12 2.49 331 98.1 82.7 2.8 4.81 6 54.6 11,237 16.93 13.11 10.83 8.23 6.41 4.3 2.53 790 250.6 72.6 2.6 2.84 8 7.01 11,186 14.34 12.02 10.12 7.22 5.56 3.83 2.46 842 31.18 77.6 3.1 4.92 8 54.8 11,412 16.26 12.65 10.32 7.73 5.98 4.01 2.36 854 295.6 69.9 3 2.87 54.8 11,412 16.26 10.29 8.62 5.26 3.59 2.06 676 5.99 2.6 5.99 2.6 5.99 2.6 5.99 3 2.87 5.96 8.99 2.6 5.99 2.6 5.99 2.6 5.99 2.6 5.99 2.6 5.99	4.402	11,293	11.71	8.99	6.75	4.69	3.42	2.13	1.35	1165	134.1	105.1	5.1	1.63	80.15
54.6 11,237 16.93 13.11 10.83 8.23 6.41 4.3 2.53 790 250.6 72.6 2.84 8 701 11,186 14.34 12.02 10.12 7.22 5.56 3.83 2.46 842 31.8 77.6 3.1 4.92 8 54.8 11,186 14.34 12.02 10.12 7.22 5.56 3.83 2.46 842 31.8 77.6 3.1 4.92 8 54.8 11,412 16.26 12.65 10.32 7.73 5.98 4.01 2.36 856 6.99 3 2.87 54.9 11,412 16.26 16.27 16.26 3.59 2.06 676 221.5 65.3 2.3 3.96 8 55.1 11,253 18.75 14.43 12.17 9.45 7.59 5.2 2.97 691 25.1 3.6 3.5 2.4 61.2 3.6 3.6 3.2	4.502	10,955	20.83	13.95	10.57	7.88	60.9	4.12	2.49	331	98.1	82.7	2.8	4.81	85.74
701 11,186 14.34 12.02 10.12 7.22 5.56 3.83 2.46 842 311.8 77.6 3.1 4.92 8 54.8 11,412 16.26 12.65 10.32 7.73 5.98 4.01 2.36 854 295.6 69.9 3 2.87 54.9 11,412 16.26 12.65 10.32 7.73 5.98 4.01 2.36 295.6 69.9 3 2.87 54.9 11,368 18.23 14.1 11.77 8.97 7.08 4.89 2.93 785 264.5 59.6 59.6 59.9 2.6 59.6 59.9 2.6 59.6 59.9 2.8 5.8 5.2 2.97 69.1 255.1 58.5 2.4 66.12 5.6 5.8 5.47 3.14 677 235.8 5.3 2.4 66.12 5.5 5.8 5.44 679 220.3 5.8 5.4 6.12 5.5 5.4	454.6	11,237	16.93	13.11	10.83	8.23	6.41	4.3	2.53	790	250.6	72.6	5.6	2.84	84.26
54.8 11,412 16.26 12.65 10.32 7.73 5.98 4.01 2.36 854 295.6 69.9 3 2.87 54.9 11,368 18.23 14.1 11.77 8.97 7.08 4.89 2.93 785 264.5 59.9 2.6 5.96 <	4.701	11,186	14.34	12.02	10.12	7.22	5.56	3.83	2.46	842	311.8	77.6	3.1	4.92	95.21
54.9 11,368 18.23 14.1 11.77 8.97 7.08 4.89 2.93 785 264.5 59.9 2.6 5.96 676 221.5 65.3 2.3 3.96 8 455 7,948 14.19 10.49 8.68 6.62 5.26 3.59 2.06 676 221.5 65.3 2.3 3.96 8 455 11,257 20.53 18.75 14.43 12.17 9.45 7.59 5.2 2.97 691 255.1 58.5 2.6 7.85 8 5.2 2.97 691 255.1 7.85 8 7.47 7.12 8 8 8 5.47 3.44 677 235.8 53.5 2.4 6.12 8 5.55 3.09 591 109.7 7.85 8.28 5.55 3.09 591 109.7 5.44 5.4 2.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4	454.8	11,412	16.26	12.65	10.32	7.73	5.98	4.01	2.36	854	295.6	6.69	က	2.87	83.7
455 7,948 14.19 10.49 8.68 6.62 5.26 3.59 2.06 676 221.5 65.3 2.3 3.96 8 455 11,253 18.75 14.43 12.17 9.45 7.59 5.2 2.97 691 255.1 58.5 2.6 7.85 8 55.1 11,257 20.53 15.47 12.94 9.89 7.88 5.47 3.14 677 235.8 53.5 2.4 6.12 8 55.2 11,217 20.49 15.48 13.19 10.2 8.22 5.8 3.44 679 226.3 55.3 2.3 7.12 8 55.3 11,110 23.13 18.19 13.81 10.3 8.18 5.55 3.09 591 109.7 59 2 2.44 8 55.4 11,281 19.69 15.36 12.9 9.77 7.65 4.94 2.81 721 244 54.4 2.4 5.3 8 55.4 11,102 25.96 15.92 10.67 6.73 4.75 3.06 1.84 200 40 66.2 3.7 4.35 8 Dev. 3.9 3.11 2.63 2.13 1.79 1.33 0.84 450 178 31.2 2.2 2.61 71.51 1 Coeff(%): 25.3 26.59 28.29 32.02 36.1 42.25 47.38 61 53.8 41.1 52.1 71.51 1	454.9	11,368	18.23	14.1	11.77	8.97	7.08	4.89	2.93	785	264.5	59.9	5.6	5.96	86.96
455 11,257 18.75 14.43 12.17 9.45 7.59 5.2 2.97 691 255.1 58.5 2.6 7.85 85.1 11,257 20.53 15.47 12.94 9.89 7.88 5.47 3.14 677 235.8 53.5 2.4 6.12 85.2 11,217 20.49 15.48 13.19 10.2 8.22 5.8 3.44 679 226.3 55.3 2.3 7.12 85.3 11,110 23.13 18.19 13.81 10.3 8.18 5.55 3.09 591 109.7 59 2 2.44 85.3 55.4 11,281 19.69 15.36 12.9 9.77 7.65 4.94 2.81 721 244 54.4 2.4 5.4 5.3 85.3 85.3 11,110 2.5.96 15.92 10.67 6.73 4.75 3.06 1.84 200 40 66.2 3.7 4.35 85.3 11,102 25.96 11.71 9.3 6.66 4.95 3.15 1.77 737 330.8 76 4.3 3.65 7.5 1.3 1.79 1.33 0.84 450 178 31.2 2.2 2.61 7.151 1.2 25.3 26.59 28.29 32.02 36.1 42.25 47.38 61 53.8 41.1 52.1 71.51 1	455	7,948	14.19	10.49	8.68	6.62	5.26	3.59	2.06	9/9	221.5	65.3	2.3	3.96	84.89
55.1 11,257 20.53 15.47 12.94 9.89 7.88 5.47 3.14 677 235.8 53.5 2.4 6.12 8 55.2 11,217 20.49 15.48 13.19 10.2 8.22 5.8 3.44 679 226.3 55.3 2.3 7.12 8 55.3 11,110 23.13 18.19 13.81 10.3 8.18 5.55 3.09 591 109.7 59 2.44 8 55.4 11,110 23.13 15.92 10.67 6.73 4.75 3.06 1.84 200 40 66.2 3.7 4.35 8 4.67 11,102 25.96 15.92 10.67 6.73 4.75 3.06 1.84 200 40 66.2 3.7 4.35 8 15.4 11,11 9.3 6.66 4.95 3.15 1.77 737 330.8 76 4.3 5.51 10ev: 3.9 2.13 1.79 1.33 0.84 450 178 41.1 52.1	455	11,253	18.75	14.43	12.17	9.45	7.59	5.2	2.97	691	255.1	58.5	2.6	7.85	83.58
55.2 11,217 20.49 15.48 13.19 10.2 8.22 5.8 3.44 679 226.3 55.3 2.3 7.12 55.3 11,110 23.13 18.19 13.81 10.3 8.18 5.55 3.09 591 109.7 59 2 2.44 8 5.45 11,110 23.13 15.92 10.67 6.73 4.75 3.06 1.84 200 40 66.2 3.7 4.35 8 1.54 11,71 9.3 6.66 4.95 3.15 1.77 737 330.8 76 4.3 3.65 7 10.67 Coeff(%): 25.3 26.59 28.29 32.02 36.1 42.25 47.38 61 53.8 41.1 52.1 71.51 71.51	155.1	11,257	20.53	15.47	12.94	9.89	7.88	5.47	3.14	677	235.8	53.5	2.4	6.12	85.83
55.3 11,110 23.13 18.19 13.81 10.3 8.18 5.55 3.09 591 109.7 59 2 2.44 8 55.4 11,281 19.69 15.36 12.9 9.77 7.65 4.94 2.81 721 244 54.4 2.4 5.3 8 5.3 8 5.3 8 4.1.1 10.2 25.96 15.92 10.67 6.73 4.75 3.06 1.84 200 40 66.2 3.7 4.35 8 4.35 8 41.1 52.1 2.63 2.13 1.79 1.33 0.84 450 178 31.2 2.2 2.61 Coeff(%): 25.3 26.59 28.29 32.02 36.1 42.25 47.38 61 53.8 41.1 52.1 71.51 1	455.2	11,217	20.49	15.48	13.19	10.2	8.22	5.8	3.44	679	226.3	55.3	2.3	7.12	88.5
55.4 11,281 19.69 15.36 12.9 9.77 7.65 4.94 2.81 721 244 54.4 2.4 5.3 8 8 .3 8 .4 1.1 2 25.96 15.92 10.67 6.73 4.75 3.06 1.84 200 40 66.2 3.7 4.35 8 .4 11,71 9.3 6.66 4.95 3.15 1.77 737 330.8 76 4.3 3.65 7	455.3	11,110	23.13	18.19	13.81	10.3	8.18	5.52	3.09	591	109.7	28	7	2.44	81.49
.467 11,102 25.96 15.92 10.67 6.73 4.75 3.06 1.84 200 40 66.2 3.7 4.35 8 15.0	455.4	11,281	19.69	15.36	12.9	9.77	7.65	4.94	2.81	721	244	54.4	2.4	5.3	85.53
15.4 11.71 9.3 6.66 4.95 3.15 1.77 737 330.8 76 4.3 3.65 7 Dev: 3.9 3.11 2.63 2.13 1.79 1.33 0.84 450 178 31.2 2.2 2.61 Coeff(%): 25.3 26.59 28.29 32.02 36.1 42.25 47.38 61 53.8 41.1 52.1 71.51	5.467	11,102	25.96	15.92	10.67	6.73	4.75	3.06	1.84	200	40	66.2	3.7	4.35	89.29
3.9 3.11 2.63 2.13 1.79 1.33 0.84 450 178 31.2 2.2 2.61 25.3 26.59 28.29 32.02 36.1 42.25 47.38 61 53.8 41.1 52.1 71.51 1	::		15.4	11.71	9.3	6.66	4.95	3.15	1.77	737	330.8	76	4. S.	3.65	79.51
25.3 26.59 28.29 32.02 36.1 42.25 47.38 61 53.8 41.1 52.1 71.51 1		ev:	3.9	3.11	2.63	2.13	1.79	1.33	0.84	450	178	31.2	2.2	2.61	9.01
	O	:oeff(%):	25.3	26.59	28.29	32.02	36.1	42.25	47.38	61	53.8	4	52.1	71.51	11.33

PRECONSTUCTION MODULI DISTRIBUTION E Values

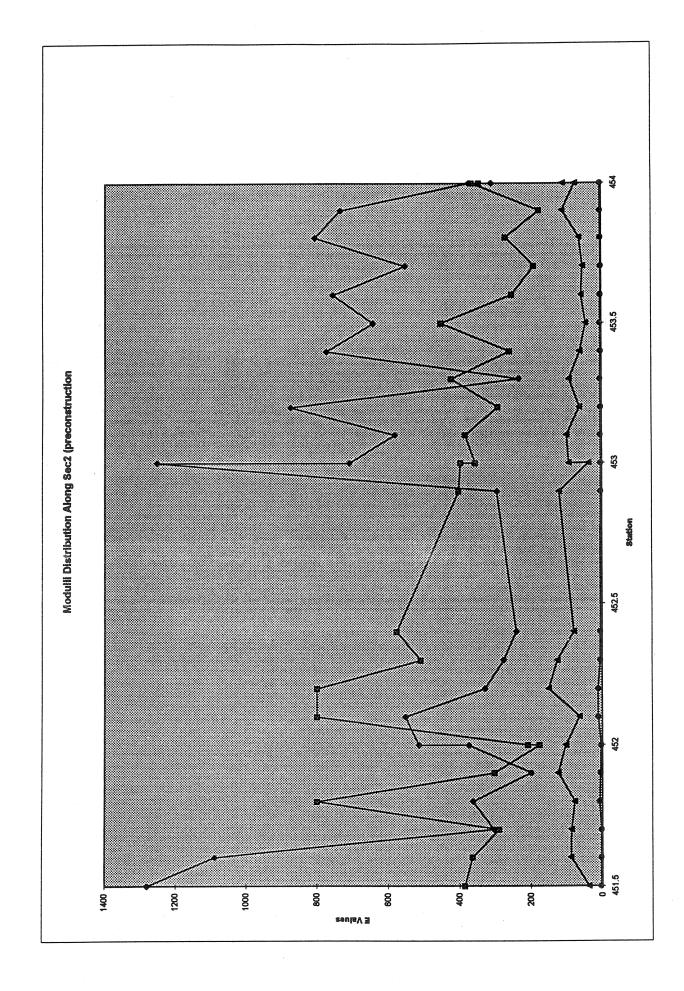
Page 1



Absection (ksl): values (ksl): SUBB(E3) SUBG(E4) ERR/Sens Bedr 13.5 3 4.9 142.8 6.8 2.15 109.7 4.2 1.45 109.7 4.2 1.45 100.6 3.4 1.98 45.9 3.4 1.98 45.9 3.4 1.98 45.9 3.1 5.94 57.5 2.8 1.85 88.7 3 2.04 69.9 3.1 5.94 106.1 3.5 2.74 89.6 3 2.2 1.45 50.7 2.9 66.5 2.5 66.5 2.5 86.1 3.4 1.24 102.1 3.4 1.24 86.26 2.6876	E	MODULU	MODULU ANALYSI	SYSTEM	(SUMMAR REPORT) (Version	EPORT) (Ve	rsion 4.2)	_							
Name	District:						MO	1	ANGE(psi)		Poisson Ratio				
Single Fig.	Highway/Ro		US030	Pavement:			Z.	c	faximum		Values				
Check Near Load Near Loa				Base: Subbase:		3.6 8.0 8.0			800,000 150,000		0.35				
Close R1 R2 R3 R4 R5 R6 R7 SURF(E1) BASE(E2) SUBR(E3) SUBG(E4) ERRIVERS Beard R41 R5 R4 R5 R6 R7 SURF(E1) BASE(E2) SUBR(E3) SUBG(E4) ERRIVERS Beard R42 R5 R15 R14 R15				Subgrade:	H4:	29		10,000			0.45			•	bsolute
(184) R1 R2 R3 R4 R5 R5 R7 Suppose an investigation of the control of the cont		Load	***************************************	Measured	Deflection (n	ile)	er e	***************************************		* poteliole	Andrell	(A)	÷	Ω,	£
47.3 11,881 25.33 20,622 16.7 11,74 8.22 4.2 207 882 297,4 135 3 4.9 47.4 11877 1122 81.5 61.4 4.05 2.94 2 1.56 829 125.9 12.9 1.6 1.17 1.2 8.1 6.1 4.05 2.94 2 1.56 8.2 1.6 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 1.17 2.2 1.26 6.9 2.15 1.14 1.17	Station	(sql)	R	R2	R3 R		R6			URF(E1)	SASE(E2) SI	uues UBB(E3) SI	si). JBG(E4) EF	R/Sens B	edrock
47.4 11817 1122 815 6.14 4.05 2.94 2 1.56 829 1259 1428 6.8 2.15 6.14 4.05 2.94 2 1.56 829 1529 1428 6.8 2.15 4 1.3 47.5 11,374 13.74 10.04 8.54 6.05 4.55 3.37 2.44 1.89 6.96 23.11 100.7 4.2 1.84 1.89 6.96 23.11 100.7 4.13 4.65 3.37 2.44 1.89 6.96 23.11 100.7 4.13 1.84 1.05 3.24 1.89 6.96 23.11 100.7 4.13 1.84 1.05 3.24 1.89 6.96 23.11 1.99 1.10 4.13 1.89 1.89 23.11 1.90 4.13 1.89 4.13 4.13 1.89 4.13 4.13 1.89 4.13 4.13 4.14 1.89 6.96 23.11 1.99 4.12 4.	447.3	•			16.77	11.74	8.22	4.2	2.07	892	297.4	13.5	ю	9	76.5
47.5 11,877 12,88 10.08 8.29 6.1 4 of 1 3.25 2.25 82.3 12.06 4 1.3 47.6 11,744 137.4 10.08 8.54 6.02 4.53 3.11 2.06 619 311 109.7 4.2 1.45 47.7 11,704 13.74 10.64 6.54 6.02 4.53 3.11 2.06 619 311 109.7 4.2 1.45 47.8 11,704 15.06 15.20 10.42 7.18 5.49 3.54 2.10 5.90 23.12 7.41 15.94 2.93 5.89 2.35 1.04 1.04 1.04 1.04 3.7 2.44 1.06 4.03 7.24 4.6 2.05 2.12 4.4 1.06 4.0 3.7 4.4 1.06 4.0 3.0 4.0 3.0 2.0 4.0 3.0 6.0 3.1 4.0 3.0 4.0 3.0 4.0 3.0	447.4	•				4.05	2.94	8	1.56	828	125.9	142.8	6.8	2.15	95.7
47.6 11.74 13.74 10.64 85.4 6.02 4.53 3.11 2.08 619 311 109.7 4.2 1.45 47.7 11.896 11.72 11.73 3.46 6.05 4.65 3.37 2.44 1.89 689 23.11 1.60 5.8 2.34 1.69 5.88 2.34 1.69 3.44 1.89 6.05 2.31 1.60 5.8 2.34 1.69 2.88 2.34 1.69 3.44 1.89 2.89 2.35 1.41 1.89 2.89 2.35 1.41 1.69 2.89 2.35 2.44 1.89 1.89 1.89 2.44 1.89 1.89 2.44 1.89 2.44 1.89 2.44 4.89 2.44 4.89 2.44 4.85 2.44 4.89 2.44 4.89 2.44 4.89 2.44 4.89 2.44 4.89 2.44 4.89 2.45 2.89 2.34 1.99 2.44 1.89 <th< td=""><td>447.5</td><td></td><td></td><td></td><td></td><td>6.1</td><td>4.61</td><td>3.25</td><td>2.25</td><td>829</td><td>353.3</td><td>120.6</td><td>4</td><td>6.</td><td>99.07</td></th<>	447.5					6.1	4.61	3.25	2.25	829	353.3	120.6	4	6.	99.07
4.7. 11,534 11,61 8.52 6.65 4.65 3.37 2.44 1189 636 23.11 150 5.8 2.34 1.74 11,934 11,61 8.52 6.65 3.54 2.13 569 212.2 7.1 1.74 5.05 3.14 1.74 501 221.2 4.7 1.14 5.05 3.14 1.74 501 221.2 4.7 1.14 5.05 3.14 1.74 501 221.2 4.7 1.14 5.05 3.14 1.74 501 221.2 4.7 1.14 5.05 3.14 1.74 501 221.2 4.7 1.14 5.05 3.14 1.74 501 221.2 4.7 1.14 5.05 3.14 1.74 501 221.2 4.7 1.14 5.05 3.14 1.74 501 221.2 4.7 3.14 3.14 3.7 3.0 3.4 3.0 3.0 3.0 3.0 3.1 3.0 3.0 3.0	447.6					6.02	4.53	3.11	2.08	619	311	109.7	4.2	1.45	96.12
47.8 11.564 17.33 13.46 10.42 7.18 5.49 3.54 2.13 569 212.2 74.1 3.7 184 47.8 11.766 15.5 12.2 9.77 7.11 5.57 3.86 2.36 588 235.6 10.26 3.4 1.86 44.8 11.658 12.2 9.77 7.11 5.57 3.46 2.56 458 286.5 10.2 3.7 1.86 44.8 11.658 12.2 14.86 11.41 8.18 6.48 2.56 458 286.5 1.86 1.87 3.94 2.95 1.86 1.88 1.88 1.88 1.88 1.88 1.88 1.88 1.88 1.88 1.88 1.88 1.88 1.88 2.86 2.94 2.86 2.94 2.89 2.84 2.84 2.89 2.84 2.89 2.84 2.89 2.84 2.89 2.84 2.89 2.89 2.89 2.89 2.89 <t< td=""><td>447.7</td><td>•</td><td></td><td></td><td></td><td>4.65</td><td>3.37</td><td>2.44</td><td>1.89</td><td>636</td><td>231.1</td><td>150</td><td>5.8</td><td>2.34</td><td>117.92</td></t<>	447.7	•				4.65	3.37	2.44	1.89	636	231.1	150	5.8	2.34	117.92
4.6 15.9 15.2 19.7 7.11 5.57 3.85 2.36 588 225.6 102.6 3.4 1.98 1.88 1.88 1.88 1.89 1.82 3.4 1.98 1.88 1.88 1.89 1.82 3.4 1.98 1.89 1.89 1.89 1.89 1.89 1.89 1.89	447.8		_		10.42	7.18	5.49	3.54	2.13	269	212.2	74.1	3.7	1.84	87.63
448 6 0,845 15,156 1267 9,72 5,72 5,05 3,14 1,74 501 2212 45,9 3 183 183 183 448 11,658 15,27 14,68 133 14,86 11,41 8,18 6,48 4,5 5,55 45,8 1262 8,7 3,45 12,6 12,6 13,7 11,73 14,86 16,22 12,46 10,37 7,53 5,87 3,94 2,49 5,50 3,45 7,93 3,45 7,93 3,3 2,04 8,3 11,72 16,52 12,24 10,37 11,37 8,49 6,78 4,8 3,07 8,26 308,7 6,99 3,1 5,94 48,3 11,72 16,52 12,24 11,37 8,49 6,42 2,24 45,9 23,2 16,18 11,71 8,28 6,39 5,43 18,9 16,11 18,7 13,2 11,11 8,28 6,39 2,41 5,94 2,95 23,5 18,9 18,9 1,611 17,8 13,69 11,07 8,31 6,63 4,74 2,87 806 19,55 83,5 2,8 18,8 2,7 2,43 11,61 18,7 13,69 11,07 8,31 6,63 4,74 2,87 806 19,55 83,5 2,8 18,8 2,7 2,43 11,63 18,24 14,81 12,07 8,16 6,39 4,2 2,47 2,47 2,47 2,47 2,47 2,47 2,47	447.9	11,786	•		9.77	7.11	5.57	3.85	2.36	288	235.6	102.6	Э. 4	1.98	86.5
446 11,530 21,11 10.94 11,530 21,56 456 261,6 51,5 28 185 28 185 28 185 28 28 28 28 28 28 28 28 28 28 28 28 28 28 28 28 28 30	844 848	8,385			9.72	6.72	5.05	3.14	1.74	50	221.2	45.9	က	£8.	84.7
	440	2,000			13.3	G. G.	7.24	4. 6. 1	2.56	ا ا	281.6	57.5	2.8	.85 58	2.
48.5 11,774 16.52 20.33 16.18 11.75 8.98 5.68 2.94 226 222.3 55.9 2.14 5.94 5.94 5.43 5.14 11.75 8.98 5.68 5.68 2.94 226 222.3 55.9 2.1 5.94 5.94 5.94 5.95 5.95 5.9 2.1 5.94 5.94 5.95 5.95 5.95 5.9 5.9 5.9 5.9 5.9 5.9	448 201	11,728			•	8.18 5.28	6.48	ر دن دن	2.55	\$3 \$3 \$3	126.2	88.7	ო (2.06	82.73
48.5 11,714 16.52 2.23 16.18 17.7 8.96 5.49 5.69 2.94 285 2.22 55.9 2.7 2.4 48.5 11,714 16.52 12.26 9.53 6.89 5.43 3.86 2.28 5.20 156.9 106.1 3.5 2.4 48.5 11,714 16.52 12.26 9.53 6.89 5.43 2.84 4.42 2.24 4.59 2.35.2 81.8 2.7 2.4 48.6 19.04 14.58 11.78 8.91 6.96 4.42 2.24 4.59 2.35.2 81.8 2.7 2.43 1.35 11.11 8.28 6.36 4.35 2.67 4.66 201.1 89.6 3 2.36 2.35 2.49 1.591 20.63 16.43 13.26 9.9 7.78 5.56 3.39 6.89 2.49.1 59.1 2.5 2.78 48.9 11,611 17.8 13.65 11.07 8.31 6.63 4.74 2.87 806 19.55 83.5 2.8 2.84 1.591 18.24 14.81 12.07 8.15 5.19 3.54 2.02 776 5.20 5.42 3.95 11,289 11	448.3	11,658				2. o	0.07 8.78	, a	2 .4 G	g 6	2004.0	5 5 5 6	ე. ¢ ე. ბ	20.0	80.8 80.8 80.8
48.5 11,714 16.52 12.26 9.53 6.89 5.43 3.86 2.28 5.00 156.9 106.1 3.5 2.74 486 11,408 19.04 14.58 11.78 8.91 6.96 4.42 2.24 459 235.2 81.8 2.7 2.43 7.78 7.86 11,591 20.63 16.43 13.26 9.9 7.78 5.56 3.39 6.89 249.1 59.1 59.1 2.5 2.78 48.8 11,591 20.63 16.43 13.26 9.9 7.78 5.56 3.39 6.89 249.1 59.1 59.1 2.5 2.78 44.9 8.90 11.31 9.26 6.8 5.19 3.54 2.02 771 20.2 771 20.2 771 20.2 771 20.2 771 20.2 771 20.2 771 20.2 771 20.2 771 20.2 771 20.2 771 20.2 771 20.2 772 20.2 773 20.2 773 20.2 773 20.2 774 20.2 775 20.2 774	448.404	11,563				11.75	86.9	5,68	2.0	285	200.7	5. 5. 5. 0.	- 0	2.5	83.7
48.6 11,408 19.04 14.58 11.78 8.91 6.96 4.42 2.24 459 235.2 811.8 2.7 2.43 7.75 11,611 18.57 13.52 11.11 8.28 6.36 4.35 2.67 466 201.1 89.6 3 2.36 4.35 2.67 466 201.1 89.6 3 2.36 4.8 2.36 4.8 2.36 4.35 2.67 4.66 201.1 89.6 3 2.36 4.35 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8	448.5	11,714				6.89	5.43	3.86	2.28	520	156.9	106.1	3.5	2.74	83.16
705 11,611 18.57 13.52 11.11 8.28 6.36 4.35 2.67 466 201.1 89.6 3 2.36 48.8 11,511 2.063 16.43 13.26 9.9 7.78 5.56 3.39 689 249.1 59.1 2.5 2.78 8 2.78 8.31 6.63 4.74 2.87 806 195.5 83.5 2.84 8 8 2.84 8 8 8 9 </td <td>448.6</td> <td>11,408</td> <td></td> <td></td> <td>11.78</td> <td>8.91</td> <td>6.96</td> <td>4.42</td> <td>2.24</td> <td>459</td> <td>235.2</td> <td>81.8</td> <td>2.7</td> <td>2.43</td> <td>77.56</td>	448.6	11,408			11.78	8.91	6.96	4.42	2.24	459	235.2	81.8	2.7	2.43	77.56
48.8 11,591 20.63 16.43 13.26 9.9 7.78 5.56 3.39 689 249.1 59.1 2.5 2.78 8 48.9 11,611 17.8 13.65 11.07 8.31 6.63 4.74 2.87 806 195.5 83.5 2.8 2.84 8 44.9 8,306 13.68 11.31 8.26 6.8 5.19 3.54 2.02 761 263.8 62.5 2.6 1.58 8 44.9 11,631 18.24 15.09 12.52 9.5 7.35 5.09 2.86 879 292.9 50.7 2.9 5.63 8 49.1 11,579 18.84 14.81 12.07 9.16 7.33 5.15 3.15 736 258.2 72.4 2.6 2.73 8 49.2 11,269 21.15 18.64 13.4 9.93 7.28 5.27 3.37 736 81.6 66.5 2.5 2.06 8 49.5 11,269 21.15 18.64 10.97 7.79 5.99 4.2 2.47 5.25 242.3 86.1 3.4 1.24 8 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 355 242.3 86.1 3.4 1.24 8 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 35.8 80.3 3.3 2.54 8 Coeff(%): 21.02 22.04 22.49 23.3 23.41 22.46 20.43 31 29.4 39.2 30.5 48.97	448.705	11,611			11.1	8.28	6.36	4.35	2.67	466	201.1	89.6	က	2.36	89.16
48.9 11,611 17.8 13.65 11.07 8.31 6.63 4.74 2.87 806 195.5 83.5 2.8 2.84 6 449 8,306 13.68 11.31 9.26 6.8 5.19 3.54 2.02 761 263.8 62.5 2.6 1.58 6 449 11,631 18.24 15.09 12.52 9.5 7.35 5.09 2.86 879 292.9 50.7 2.9 5.63 6 49.1 11,579 18.84 14.81 12.07 9.16 7.33 5.15 3.15 736 258.2 72.4 2.6 2.73 6 49.2 11,269 21.15 18.64 13.4 9.93 7.28 5.27 3.37 736 81.6 66.5 2.5 2.06 9 3.03 11,360 17.3 13.61 10.97 7.79 5.99 4.2 2.47 5.25 242.3 86.1 3 1.63 6 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 355 242.5 163.062 6 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 355 244.5 80.3 3.3 2.54 6 Dev. 367 3.02 2.47 1.86 1.43 0.92 0.5 208 71.9 31.5 1 1.24 6 Coeff(%): 21.02 22.04 22.49 23.3 23.41 22.46 20.43 31 29.4 39.2 30.5 48.97	448.8	11,591			13.26	6.6	7.78	5.56	3.30	683	249.1	59.1	2.5	2.78	89.47
449 8,306 13.68 11.31 9.26 6.8 5.19 3.54 2.02 761 263.8 62.5 2.6 1.58 6 449 11,631 18.24 15.09 12.52 9.5 7.35 5.09 2.86 879 292.9 5.0.7 2.9 5.63 8 49.1 11,579 18.84 14.81 12.07 9.16 7.33 5.15 736 258.2 72.4 2.6 2.73 8 49.2 11,269 21.15 18.64 13.4 9.93 7.28 5.27 3.37 736 81.6 66.5 2.5 2.06 9 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 355 303.8 102.1 3.4 1.24 9 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 355 303.8 102.1 3.4 1.24 9 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 355 303.8 102.1 3.4 1.24 9 49.5 11,293 16.61 2.55 9.91 7.29 5.49 3.76 2.15 355 303.8 102.1 3.4 1.24 9 The \$7.6\text{s} \text{value of E} = \text{s} \text{467.626} \text{163.0626} \text{66.26} \text{2.6876} \text{2.247} \text{2.249} 2.33 2.341 2.246 2.043 31 2.94 39.2 30.5 48.92	448.9	11,611			11.07	8.31	6.63	4.74	2.87	908	195.5	83.5	2.8	2.84	86.39
49.1 11,573 18.24 15.09 12.52 9.5 7.35 5.09 2.86 879 292.9 50.7 2.9 5.63 8 49.1 11,579 18.84 14.81 12.07 9.16 7.33 5.15 3.15 736 258.2 72.4 2.6 2.73 8 49.2 11,269 21.15 16.64 13.4 9.93 7.28 5.27 3.37 736 81.6 66.5 2.5 2.06 9 30.3 11,360 17.3 13.61 10.97 7.79 5.99 4.2 2.47 5.25 242.3 86.1 3 1.63 8 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 3.55 303.8 102.1 3.4 1.24 8 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 3.55 303.8 102.1 3.4 1.24 8 The \$7.6 \times \text{A} \text{ value of E's = } \text{ 467.626 163.0626 66.26 2.6876 } 1.24 66.3 2.47 13.69 11 8 6.1 4.1 2.44 663 2.445 80.3 3.3 2.54 8 Coeff(%): 21.02 22.04 22.49 23.3 23.41 22.46 20.43 31 29.4 39.2 30.5 48.92	9449	8,306			9.26	6 .8	5.19	3.54 4	2.02	761	263.8	62.5	2.6	1.58	85.43
49.1 11,579 18.84 14.81 12.07 9.16 7.33 5.15 736 258.2 72.4 2.6 2.73 8 49.2 11,269 21.15 16.64 13.4 9.93 7.28 5.27 3.37 736 81.6 66.5 2.5 2.06 9 49.2 11,269 21.15 16.64 13.4 9.93 7.28 5.27 3.37 736 81.6 66.5 2.5 2.06 9 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 3.55 303.8 102.1 3.4 1.24 8 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 3.55 303.8 102.1 3.4 1.24 8 The 87.6% value of E's = 467.626 163.0626 66.26 2.6876 17.47 13.69 11 8 6.1 4.1 2.44 663 244.5 80.3 3.3 2.54 8 Dev. 3.67 3.02 2.47 1.86 1.43 0.92 0.5 208 71.9 31.5 1 1.24 Coeff(%): 21.02 22.04 22.49 23.3 23.41 22.46 20.43 31 29.4 39.2 30.5 48.92	984	11,631			12.52	9.5	7.35	2.09	2.86	879	292.9	20.7	5.9	5. B	82.67
49.2 11,289 21.15 16.64 13.4 9.93 7.28 5.27 3.37 736 81.6 66.5 2.5 2.06 8 8 8.3 3.3 11,289 11,289 11,289 11,289 12.5 9.91 7.29 5.49 3.76 2.15 3.55 303.8 102.1 3.4 1.24 8	449.1	11,5/9			12.07	9.18	7.33	5.15	3.15	736	258.2	72.4	2.6	2.73	87.8
303 11,360 17.3 13.61 10.97 7.79 5.99 4.2 2.47 525 242.3 86.1 3 1.63 8 49.5 11,293 16.61 12.55 9.91 7.29 5.49 3.76 2.15 355 303.8 102.1 3.4 1.24 8 1.	449.2	11,269			13.4		7.28	5.27	3.37	736	81.6	66.5	2.5	2.06	9 8 9
49.5 11,233 16.61 12.55 9.91 7.29 5.49 3.76 2.15 355 303.8 102.1 3.4 1.24 8 The 87.6% value of E's = 467.626 163.0626 65.26 2.6876 17.47 13.69 11 8 6.1 4.1 2.44 663 244.5 80.3 3.3 2.54 8 Dev: 3.67 3.02 2.47 1.86 1.43 0.92 0.5 208 71.9 31.5 1 1.24 8 Coeff(%): 21.02 22.04 22.49 23.3 23.41 22.46 20.43 31 29.4 39.2 30.5 48.92	449.303	11,360		E. (10.97	7.79	5.99	4.2	2.47	525	242.3	86.1	ന	<u>ਨ</u>	87.0
The 87.5% value of E's # 467.626 163.0626 66.26 2.6876 17.47 13.69 11 8 6.1 4.1 2.44 663 244.5 80.3 3.3 2.54 (Dev: 3.67 3.02 2.47 1.86 1.43 0.92 0.5 208 71.9 31.5 1 1.24 Coeff(%): 21.02 22.04 22.49 23.3 23.41 22.46 20.43 31 29.4 39.2 30.5 48.92	44G.U	11,293	16.61	12.55	9.91	~	5.49	3.78	2.15	355	303.8	102.1	æ. ₹.	1.24	න ක
17.47 13.69 11 8 6.1 4.1 2.44 663 244.5 80.3 3.3 2.54 10 1.24 10 1.24 11						The	87.5% val	ue of E's		457.625	163.0625	66.26	2.5875		
Dev: 3.67 3.02 2.47 1.86 1.43 0.92 0.5 208 71.9 31.5 1 1.24 Coeff(%): 21.02 22.04 22.49 23.3 23.41 22.46 20.43 31 29.4 39.2 30.5 48.92	Mean:		17.47			6 0	6.1	4.1	2.44	88	244.5	80.3	93	2.54	86.61
Coeff(%): 21.02 22.04 22.49 23.3 23.41 22.46 20.43 31 29.4 39.2 30.5 48.92		Dev:	3.67			1.86	1.43	0.92	0.5	208	71.9	31.5	-	1.24	7.7
		Coeff(%):	21.02			23.3	23.41	22.48	20.43	34	29.4	39.2	30.5	ΔA CO	00



	E	MODULU	MODULU ANALYSI	SYSTEM	_	REPO	(SUMMAR REPORT) (Version	ion 4.2)								
	District:	ស							Σ	MODULI	RANGE(psi)		Poisson Ratio			
	i emp. : Highway/Road;		02030		Pavement.	,	Fhickness(in)	0		Minimum	Maximum		Values			
i ei					Base:			. 80 1.00		40,000	800,000		0.35			
,					Subbase:	Ξ̈́		10.8		10,000	150,000		0.45			
		***************************************	************		Subgrade			53.4		10,000 H4:	Η .:		0.45			Absolute
		Load	Measured	Deflection	n (mils):						Calculated Moduli	Inpo	values	(ksi):		5 5 5
	Station	(sql)	R1	R2	R3.	R4	RS	R6	R7		SURF(E1) BASE(E2)	ASE(E2)	SUBB(E3)	SUBG(E4)	SUBB(E3) SUBG(E4) ERR/Sens Bedrock	Sedrock
	451.5	11,488	13.96		3 8.88		6.26	4.15	2.17	0.94	1281	385.5	37.9	4	4 5.8	71 03
	451.601			2 9.22			6.41	5.22	3.39	18.	1090	363.2	88.8		12.58	72.97
	451.7		•		_		7.6	5.53	က	0.97	304	289.3	86.8		5.03	70.48
	451.8						3.44	2.18	1.03	0.34	363	800	77.5	80	3.03	65.46
	451.902	-		5 9.46	-		4.74	3.22	1.81	0.93	200	302	123.5	S	1.93	74.36
	452						4.25	3.18	1.99	1.16	374	176.8	103.4		1.98	82.69
	452		7	10.68			5.98	4.57	2.89	1.72	515	208.6	101.9		2.83	81.57
	452.1						.57	1.39	0.68	0.37	553	8	2		2.73	65.2
	452.2	•					8. J	- 4 0	0.72	0.36	328	8	150	_	2.86	62.7
	452.3			3 8.85			5.5	3.18	38.	56.	276	508.9	125.4		2.35	77.28
	452.401	-					4.7	3.11	1.39	0. 49.	241	575.7	79.7	5.8	4.64	65.08
	452.9	-	•				5.42	3.91	2.3	1.2	295	402.2	120.6	4	2.32	76.96
	453					7	4.24	2.95	1.72	0.82	1253	397.1	37.1		3.26	75.82
	453			•			5.9	4.24	2.55	1.27	709	355	92.9	3.5	2.95	75.26
	453.1	·					4.87	3.62	2.09	0.96	581	383.9	98.7		2.14	70.7
	453.2	~			•		7.66	5.14	3.09	<u>4</u> .3	875	291.6	62.3		4.58	74.36
	453.3	4					5.57	3.87	2.19	1.02	232	42	91.3		1.88	74.97
	453.4	-			-		8.16	6.07	3.67	1.67	773	257.7	60.5		3.18	75.4
	453.5						5.63	3.65	2.1	0.87	641	451.6	44.5		1.57	74.15
	453.6				•		8.78	6.22	4.15	2.3	753	25	56.8	2.5	5.01	83.12
	453.702				5 13.87	•	10.54	7.91	5.05	2.7	552	189.5	52.5		2.57	82.1
	453.804			_	•		8.57	6.7	4.21	2.09	80 90	268.2	62.3		10.1	75.82
	453.901	4					5.25	3.89	2.57	1.72	733	175.7	110.6	3.7	1.58	92.12
	454				~		4.5	3.15	1.84	1.2	373	364.4	74.5	3.6	2.29	80.68
	454	11,392	15.08	3 10.70	8.54		5.97	4.27	2.59	•	308	343.8	108.4	3.6	2.12	82.05
								age of the second	The 87.6% value		276	208.6	62.6	2.7		
Deliver of the Party of the Par			200	-			L			,	9					4
	Mean:	Dev.	13.32	9.98	7.87		5.5 2.5 5.0	3.92	2.3 8.0	1.17	727	402.6	82.7	4. c 80. 4	3.62	73.04
	Var	Coeff(%):	24.08	•	_			39.14	46.02	50.3	§ 88	49.1	37.6		68.67	9.09
						***************************************	- Children Children		***************************************							



	Absolute Dpth to	sedrock 90.11	82.78	90.84 79.51	78.92	86.52	81.14	76.25	300	စ္တ ဗွ	82.38	69.2		81.16	23.8
	C (September 1977)	.r/>ens t	4.17	3.07	2.15	2.96	3.87	7.96	7.03	3.07	0.40 0.40	3.56		3.86	188
Poisson Ratio Values 0.35	0.45 Absolute 0.45 Dpth (ksl): to to SUIRGEA) ERP/Sane Reducts	3.3 3.3	2.9	හ. හ. ර	2.9	2.8	2 5	2.5	2.6	2.7	2.4	6.3	2.5625	3.5	6.
9 <u>8</u> 2			87.7	116.2 95.2	86.3	83.7	70.6	59.2	76.7	79.7	7.07 96	12	70.6625	87.1	ď
RANGE(psi) Maximum 2,000,000 800,000	150,000 oduli val	43E(E2) 34.	252.1	154.5	186.1	144.2 164.2	239.5	254.9	223.2	797.7	42.3	143.2	8.3	175.2	680
MODULI R/ Minimum Mi 200,000 2, 40.000	žã	ONT(E1) BY 281	857	382 382	427	360	756	765	755	01.1 00.7	2 4 5 4	500	269	208	OPC
ΣΣ		2.38	2.56	2.14	2.34	2.0 5	2.97	2.8	3.44	2. 4 0. 8	- O	0.62	ilues =	2.29	4
K 60	10.8 61.6		4.33	5.18 4.16	4.28	3.52	5.14	5.89	5.26	4. 4. D. 4.	1.78	4.	The 87.5% values =	3.98	200
Version 4.2) Thickness(in) 41:	98	1	6.09	4.03 5.73	6.43	5.1	7.27	7.86	7.1	4 62	3.1	2.89	The state of the s	5.77	ž.
RT) (Subbase: H3: Subgrade: H4:		7.8	7.59	8.46	6.65 9.28	9.22	9.92	7.96	5 .c3	4.67	4.23			90
MMAR REPO		0.51	10.15	9.13 10.83	11.24	9.26 12.6	11.87	12.78	11.91	1.7 2.0	7.72	6.87			200
4	Deflection (mlls): R2 R3	13.67	12.19	13.76	14.35	11.71	14.83	14.97	14.22	11.34	1.54	9.72		13.18	70
YSI SYSTEM	1		16.89			16.37 20.93				17.58					1
MODULU ANALYSI 5 107 ad: US030	Measured R1		11,952 1	•		9,303 1 12,592 2			11,901						
ا ا	Load (lbs)					,									2
TTI MO District: Temp.: Highway/Road:	Station	454.5	454.6	454.8	454.9	455 455	455.1	455.2	455.3	455.5	455.6	455.712		Mean:	

